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Review Article

Suicide, self-harm, and suicide ideation in nurses and midwives: A systematic review of prevalence, contributory factors, and interventions

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ABSTRACT

Background: Nurses have been identified as an occupational group at increased risk of suicide. This systematic review examines the prevalence of, and factors influencing, suicide and related behaviours among nurses and midwives (PROSPERO pre-registration CRD42021270297).
Methods: MEDLINE, PsycINFO, and CINAHL were searched. Articles published from 1996 onwards exploring suicidal thoughts and behaviours among nurses and midwives were included. Quality of included studies was assessed. Articles were subjected to narrative synthesis informed by suicide data examined, study design, and quality. PRISMA guidelines were followed.
Results: A total of 100 studies were eligible for inclusion in the review. Articles examining suicide exclusively among midwives were absent from the literature. Several studies confirmed that nursing professionals, especially female, are at increased risk of suicide, particularly by self-poisoning. Factors contributing to risk include psychiatric disorders, alcohol and substance misuse, physical health problems, and occupational and interpersonal difficulties. In studies of non-fatal suicidal behaviours, including during the COVID-19 pandemic, psychiatric, psychological, physical and occupational factors were contributory. There has been little investigation of interventions for prevention of suicide in nurses.
Limitations: Only articles published in English language were reviewed.
Conclusions: The findings highlight the risk of suicide in nurses. They also show a combination of factors contribute to suicide and non-fatal suicidal behaviour in nurses, with psychiatric, psychological, physical health, occupational and substance misuse (especially alcohol) problems being particularly important. The limited evidence regarding prevention measures indicates a major need to develop primary and secondary interventions for this at-risk occupational group, for example, education regarding enhancing wellbeing and safe alcohol use, alongside accessible psychological support.

1. Introduction

The risk of suicide among nurses has been highlighted as concerning (Hawton and Vislisel, 1999; Alderson et al., 2015). International research has shown that nurses may be at increased risk of suicide, with female nurses being particularly vulnerable (Hawton and Vislisel, 1999; Alderson et al., 2015). Data from the Office for National Statistics in the United Kingdom (UK) and from the American National Violent Death Reporting System have shown that female nurses have a higher suicide rate than that of females in the general population (Windsor-Shellard and Gunnell, 2019; Davidson et al., 2020a).

Several issues have been highlighted which may differentiate nursing professionals from the general population or other healthcare professions. Nursing is a physically and psychologically demanding occupation, including long and irregular working hours, high workload, low staffing levels, frequent emotional demands, and challenging working relationships (Dall'Ora et al., 2020). These challenges may contribute to the prevalence of psychiatric conditions (Wang et al., 2015; Soravia et al., 2021) and burnout (Dall'Ora et al., 2020) among nurses. Nursing professionals may use different suicide methods than the general population. Studies in the United States of America (USA) and UK have shown that nurses are most likely to die by suicide through self-

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poisoning, whereas the general population are more likely to use firearms in the USA (Davidson et al., 2021a), or hanging or strangulation in the UK (The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020).

Research on suicide among nurses has previously been synthesised, with an international review published in 1999 finding evidence for increased risk of suicide among female nurses and highlighting the paucity of studies examining associated factors. The review identified evidence that smoking contributes to suicide risk and caffeine intake may be protective (Hawton and Vislisel, 1999). A more recent review was published in 2015 and identified nine relevant studies examining suicide prevalence and associated factors (Alderson et al., 2015). This review also highlighted the high incidence of suicide in nurses but noted how few studies have focussed on this issue. It reported additional evidence regarding substance misuse and occupational stress related to suicide in this occupational group. However, the review did not employ full systematic review methodology, such as quality assessment. Furthermore, suicide among midwives was not examined and all included studies were from high income countries. In other research in this area, midwives or maternity nurses have been grouped with nurses (e.g., Milner et al., 2016; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020).

Suicide attempts, self-harm and suicide ideation are risk factors for future attempted and completed suicide (Hawton et al., 2015; Hubers et al., 2018; Large et al., 2021). However, studies examining non-fatal suicidal behaviours and suicide ideation by nurses or midwives have not been systematically reviewed. Given the growing concern about suicide risk among nurses and midwives including the possible impact of COVID-19 (e.g., Rahman and Plummer, 2020) an updated review using systematic methods is warranted. Our aim was to synthesise evidence from studies reporting on suicide and suicidal thoughts and behaviours among nurses and midwives, with a focus on epidemiology, associated factors, and interventions. The findings were used to identify implications for further research and prevention efforts.

2. Methods

2.1. Search strategy and selection criteria

The electronic databases CINAHL, Medline and PsycINFO were searched using tailored search terms and MESH headings (see Supplementary file 1 for search strategy). Additional articles were identified by forward and backward citation searching, searching first author publication lists of included studies, contacting authors where appropriate, and searching reference lists of related reviews. Final searches were conducted on 5th August 2021.

Searches were limited to empirical articles published in English language from 1996 onwards, reflecting the date of the last review conducted by author KH (Hawton and Vislisel, 1999). Due to the scarcity of research identified by previous reviews (Hawton and Vislisel, 1999; Alderson et al., 2015), any empirical research designs were eligible for inclusion if suicide, non-fatal suicidal behaviours (suicide attempt or self-harm), suicidal thoughts, or suicide risk among nurses and midwives were examined.

After deduplication, articles were reviewed for inclusion using title and abstract screening by one author (SG), with a second author reviewing 20 % (KL). There was 99.7 % agreement. Both authors conducted full text assessment, with 98.1 % agreement. Conflicts in inclusion were discussed between authors, with reference to the third author (KH) where required. A final forward citation search was conducted in March 2022 to identify recently published articles. Articles focussing on student nurses and midwives were separated for synthesis in another review.

2.2. Data extraction

Data were extracted by one researcher (SG), with collaboration from the research team when required. A standardised data extraction form, adapted by study design was developed to summarise study characteristics and outcomes related to suicide. Extraction was informed by domains of the Cochrane data extraction template (Cochrane Consumers and Communication, 2016) alongside a data extraction form used for a systematic review examining suicide among anaesthetists (Plunkett et al., 2021).

2.3. Quality assessment

Quality assessment was conducted using an adapted tool for assessment of studies examining suicide in anaesthetists (Plunkett et al., 2021) alongside the Mixed Methods Appraisal Tool (Hong et al., 2018). Five sets of quality criteria (for epidemiological, cohort, survey, mixed-method, and intervention studies) were designed. Appraisal included assessment of quality and risk of bias (except for mixed-method studies where bias was not assessed due to qualitative principles) and assessed components such as how suicide-related data were measured, and appropriateness of study sample (see Supplementary file 2 for full assessment criteria and scores). One author assessed all included studies (SG), with a second author reviewing 10 % (KL). Agreement between authors was 97.0 %. Where required, queries regarding assessment were discussed with the third author (KH). Quality of studies were deemed as high when 70 % of quality criteria were met, moderate at 50–69 %, and low quality at <50 %.

2.4. Data synthesis

Due to the heterogeneous nature of data reporting across studies, meta-analyses were not appropriate. Evidence was subjected to a narrative synthesis, with study findings tabulated. Data synthesis with a focus on prevalence and factors associated with suicide was performed. The synthesis was informed by the nature of the suicidal behaviour or thoughts, study focus, study design, and quality, with greater emphasis given to high quality studies.

The systematic review protocol was published on PROSPERO (CRD42021270297), and PRISMA 2020 guidelines were followed (see Supplementary file 3 for PRISMA checklist) (Page et al., 2021).

3. Results

Database searching identified 6778 unique articles, of which 237 underwent full text review. From assessment, 73 articles were eligible for inclusion (reasons for exclusion are displayed in Supplementary file 4). A further 27 articles were identified by hand-searching. Thus, 100 studies were included. A PRISMA diagram is shown in Fig. 1. Summary characteristics of included studies are shown in Table 1. Most studies were quantitative (k = 95), with an additional five mixed-methods studies. No qualitative studies were identified. Studies examining the impact of COVID-19 (k = 17) were synthesised separately to identify specific contributions of the pandemic. Most studies (k = 76) were published from 2013 onwards. See Supplementary file 5 for full characteristics of each study.

3.1. Suicide

Suicide in nurses and midwives was examined in 46 studies (Kawachi et al., 1996; Peipins et al., 1997; Langley and Stephenson, 2001; Stack, 2001; Feskanich et al., 2002; Hawton et al., 2002; Hem et al., 2005; Agerbo et al., 2007; Dimich-Ward et al., 2007; Meltzer et al., 2008; Bradley et al., 2009; Andersen et al., 2010; Mustard et al., 2010; Skegg et al., 2010; Hawton et al., 2011; Kõlves and De Leo, 2013; Lucas et al., 2013; Roberts et al., 2013; Charlton et al., 2014; Lucas et al., 2014; Tsai

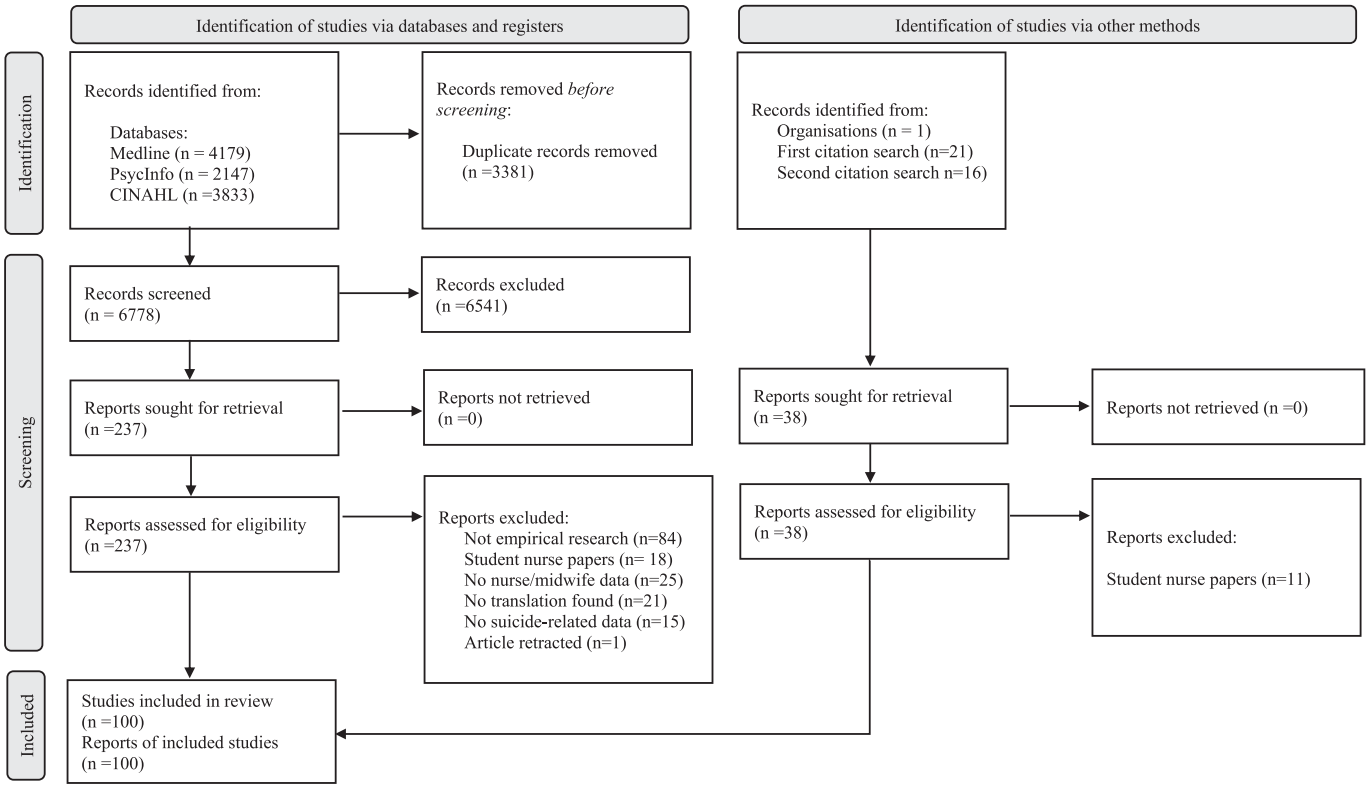

Fig. 1. PRISMA diagram of inclusion assessment.

et al., 2014; Tsai et al., 2015; Milner et al., 2016; VanderWeele et al., 2016; Pilgrim et al., 2017; Davidson et al., 2018a; Ke et al., 2018; Zeng et al., 2018; Davidson et al., 2019; Guseva Canu et al., 2019; Wei and Mukamal, 2019; Windsor-Shellard and Gunnell, 2019; Chen et al., 2020; Davidson et al., 2020a; Gupta et al., 2020; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020; Patrician et al., 2020; Peterson et al., 2020; Roberts et al., 2020; Wolf et al., 2020; Braun et al., 2021; Choflet et al., 2021; Davidson et al., 2021a; Davidson et al., 2021b; Davis et al., 2021; Kaki and Hawkins, 2021). Studies were conducted in North America (k = 29), Europe (k = 9), Oceania (k = 6), and Asia (k = 2). Most studies were epidemiological (k = 26), with additional observational, (k = 17) and mixed-method studies (k = 3). Most studies were high (k = 26) ˙or moderate quality (k = 16). Few studies were low quality (k = 4).

3.1.1. Prevalence

Prevalence of suicide among nursing professionals was assessed in most studies (k = 45). Among studies conducted in North America (k = 28), two longitudinal studies of high quality used data from the National Violent Death Reporting System (NVDRS) (Davidson et al., 2020a; Davis et al., 2021) Female nurses in the USA had greater risk than females in the general population during 2006–2016, whereas male nurses only had increased risk in years 2013–2014 (Davidson et al., 2020a). Another study found suicide risk was elevated in female nurses only (Davis et al., 2021). Evidence from the NVDRS comparing age at time of suicide between nurses and non-nurses was mixed, possibly influenced by the differing age ranges included across studies (Davidson et al., 2020a; Choflet et al., 2021; Davis et al., 2021). There was a higher proportion of white nurses than the USA nursing workforce in these studies (Davidson et al., 2020a; Choflet et al., 2021; Davis et al., 2021). A retrospective cohort study of female nurses from British Columbia, Canada, found lower risk of suicide than the general population during 1974–2000 (Dimich-Ward et al., 2007). Furthermore, a prospective cohort of 15 % of the Canadian population found only occupationally active male nurses (including assistants or therapists) had elevated rates of suicide mortality between 1991 and 2001 (Mustard et al., 2010).

Of nine studies examining prevalence of suicide in nurses in Europe two high quality Danish studies showed increased risk of suicide than education professionals (Agerbo et al., 2007; Hawton et al., 2011). Sex-stratified rates among female nurses in Norway were higher than the general population aged below 60 years, but nurses aged 60 years and over had rates similar to the general population, as did all male nurses (Hem et al., 2005). Among studies conducted in England and Wales, one high quality study showed increased suicide rates for female nurses only (Windsor-Shellard and Gunnell, 2019). Another found nurses had significantly higher suicide prevalence when examined using the proportionate mortality ratio, but not when expressed by standardised mortality ratios (Meltzer et al., 2008). Nurses who died by suicide in England and Wales were older on average than suicide decedents from the general population (The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020). A study using the Swiss national cohort showed increased SMRs for suicide for male nursing and midwifery professionals only (Guseva Canu et al., 2019).

Among the five studies conducted in Oceania, two high quality studies, one conducted in Australia and the other in New Zealand, showed increased suicide rates among nurses (and midwives in the Australian study) compared to other occupations (Milner et al., 2016; Skegg et al., 2010). Another Australian study found increased risk compared to education professionals, but not the general population (Kõlves and De Leo, 2013).

3.1.2. Factors influencing risk of suicide

3.1.2.1. Mental health and wellbeing. Thirteen studies presented data related to mental health and wellbeing (Feskanich et al., 2002; Hawton et al., 2002; Agerbo et al., 2007; Hawton et al., 2011; Kõlves and De Leo, 2013; VanderWeele et al., 2016; Davidson et al., 2019; Davidson et al., 2020a; The National Confidential Inquiry into Suicide and Safety in

Table 1
Characteristics of included studies.

Characteristic	Number of studies (N = 100)
Year of publication	
1996–2004	11 (11.0 %)
2005–2012	13 (13.0 %)
2013–2022	76 (76.0 %)
Study area	
North America	40 (40.0 %)
Asia	19 (19.0 %)
Europe	20 (20.0 %)
Oceania	7 (7.0 %)
Middle East	6 (6.0 %)
South America	5 (5.0 %)
Africa	2 (2.0 %)
Multiple countries	1 (1.0 %)
Suicide data[a]	
Suicide	47 (47.0 %)
Attempt	12 (12.0 %)
Self-harm	5 (5.0 %)
Ideation	46 (46.0 %)
Risk	7 (7.0 %)
Study coverage[a]	
Prevalence	96 (96.0 %)
Contributory factors	
Mental health and wellbeing	33 (33.0 %)
Substance use and health behaviours	23 (23.0 %)
Physical health	16 (16.0 %)
Occupational	34 (34.0 %)
Interpersonal	23 (23.0 %)
Method of harm used	24 (24.0 %)
COVID-19	17 (17.0 %)
Study design	
Survey	44 (44.0 %)
Epidemiological	28 (28.0 %)
Observational (including cohort)	20 (20.0 %)
Mixed method	5 (5.0 %)
Intervention	3 (3.0 %)
Quality rating	
High (70 %+)	39 (39.0 %)
Moderate (50–69 %)	37 (37.0 %)
Low (>50 %)	24 (24.0 %)

[a] Some studies examined multiple factors.

Mental Health, 2020; Roberts et al., 2020; Choflet et al., 2021; Davidson et al., 2021a; Davidson et al., 2021b). In a psychological autopsy study in England and Wales, nurses who died by suicide were more likely than living nurses to have a psychiatric disorder (90.5 % vs 7.1 %), personality disorder (38.1 % vs 1.2 %), comorbid psychiatric disorder (28.6 % vs 2.4 %) or combined personality and psychiatric disorders (38.1 % vs 0.0 %) diagnoses. Also, those who died by suicide had far more often previously self-harmed (71.4 % vs 2.4 %) (Hawton et al., 2002). However, it is important to note that living nurses may choose not to disclose such information and there was a high refusal rate in nurses approached as potential controls. Comorbidity of PTSD and probable depression was associated with suicide risk in the Nurses' Health II Study in the USA (Roberts et al., 2020).

Psychiatric characteristics of nurses dying by suicide have been compared with suicide decedents from other groups. Data from the Queensland Suicide Register showed nurses were more likely to have a psychiatric disorder (55.9 %) than educational professionals (44.7 %) and the general population (40.1 %) (Kõlves and De Leo, 2013). Longitudinal NVDRS data showed nurses were more likely to have mental health problems at time of death than suicide decedents in the general population in one study (2003–2017) (Choflet et al., 2021), with another study (2005–2016) finding a history of mental health problems was more common (Davidson et al., 2020a). Female nurses in the UK (including healthcare assistants) dying by suicide were no more likely to have a primary or secondary diagnosis of a range of mental health conditions than females in other occupations, although nurses were more likely to have been receiving antidepressants (SSRIs/SNRIs) (The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020). Among nurses who died by suicide in multiple countries, affective disorders, particularly depression, were the most common mental health conditions (Kõlves and De Leo, 2013; Choflet et al., 2021; Davidson et al., 2021b; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020).

Regarding prior suicidal behaviour, no differences for self-harm were found between British female nurses and other females dying by suicide within 12 months of mental health service contact, although prevalence was high in both groups (64 % vs 73 %) (The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020). Similarly, there were no differences in suicide attempts or intent disclosure between American female nurse and non-nurse decedents. However, male nurses who died were more likely than other men dying by suicide to have a history of suicidal thoughts (Davidson et al., 2020a). Among American nurse decedents who had job problems cited as contributory within law enforcement or medical examiner narratives, 43.8 % had prior suicide attempts (Davidson et al., 2021b).

The Nurses' Health Study in the USA examined stress and suicide risk (Feskanich et al., 2002). A U-shaped relationship between stress and suicide was shown. Female nurses reporting either minimal or severe home or work stress had greater risk than those reporting light stress. When home and work stress were combined, or a proxy measure of diazepam use was employed, risk further increased. No studies examining burnout and suicide were identified.

Nurses had often accessed psychiatric services prior to suicide. For example, over three-quarters of nurses who died by suicide in England and Wales had received previous psychiatric care, with almost half having previous inpatient care, or having been in contact with services at the time of death (Hawton et al., 2002). Moreover, internationally, nurses who died by suicide were more likely to be in the care of, or have a history of contact with, psychiatric services or general practitioners (mostly due to emotional problems) before suicide than living nurses (Hawton et al., 2002) and non-nurses who had died by suicide (Kõlves and De Leo, 2013; Davidson et al., 2020a; Choflet et al., 2021). However, a British study showed similar levels of contact with specialist mental health services among female nurses and non-nurses in the 12 months prior to suicide (40 % vs 38 %) (The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020). One study showed female nurses were more likely to have received psychological treatment, both at the time of death or historically than male nurses (Choflet et al., 2021). Two Danish epidemiological studies examined relative risk of suicide in nurses compared with controls after adjusting for previous psychiatric service contact (in both groups). Surprisingly, in one study excess relative risk in nurses compared with the general population was somewhat greater in individuals without previous inpatient hospital admission than in those with such a history (Agerbo et al., 2007) However, in another study which also included outpatient psychiatric care, the excess risk in nurses relative to education professionals was similar in both those with and without history of care (Hawton et al., 2011).

3.1.2.2. Substance misuse. Nine studies presented data related to substance misuse (Hawton et al., 2002; Lucas et al., 2013; VanderWeele et al., 2016; Davidson et al., 2019; Davidson et al., 2020a; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020; Choflet et al., 2021; Davidson et al., 2021a; Davidson et al., 2021b). Alcohol and substance misuse were cited as factors contributing to suicide of nurses across samples from England and Wales (Hawton et al., 2002) and the USA (Davidson et al., 2021b). Level of alcohol use was assessed in one study, where six nurses identified as using alcohol before suicide were consuming over 100 units/week (current UK guidance recommends consumption of no >14 units/week) (Hawton et al., 2002). Among death investigation notes from law enforcement or medical examiners regarding job-related suicides, 65.0 % mentioned substance

use, 66.0 % prescription medications, 38.4 % alcohol problems, and 36.5 % medication misuse or theft, with 6.4 % indicating the workplace being the source of medication (Davidson et al., 2021b). Combined substance misuse and job loss were common antecedents to suicide in nurses (Davidson et al., 2021b). However, comparisons have shown that nurses dying by suicide in both the UK and USA were no more likely to misuse alcohol and substances as listed within medical or law enforcement records than general population decedents, (Davidson et al., 2020a; Choflet et al., 2021; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020), although one study showed male nurse decedents were more likely than female nurses to have alcohol problems (Choflet et al., 2021). Furthermore, alcohol misuse was not associated with suicide risk among female nurses in the Nurses' Health Study, although a family history of alcohol misuse was (VanderWeele et al., 2016). Data from the Nurses' Health Study I and II (Lucas et al., 2013; VanderWeele et al., 2016) showed increased risk of suicide in female nurses who smoked.

3.1.2.3. Other health behaviours. Six studies presented data related to other health behaviours (Kawachi et al., 1996; Hawton et al., 2002; Charlton et al., 2014; Lucas et al., 2014; Tsai et al., 2014; VanderWeele et al., 2016). Other health-related factors investigated included BMI and diet, but with no associations being found (Tsai et al., 2014; VanderWeele et al., 2016). Use of oral contraceptives was associated with suicide across 36-years of follow-up within the Nurses' Health Study (Charlton et al., 2014). Caffeinated coffee intake appeared to be protective against female nurse suicide in the Nurses' Health Study I and II (Kawachi et al., 1996; Lucas et al., 2014). However, evidence regarding more general caffeine intake (for example tea, coffee, carbonated drinks) has been mixed (Kawachi et al., 1996; Hawton et al., 2002; Lucas et al., 2014; VanderWeele et al., 2016).

3.1.2.4. Physical health. Nine studies examined the impact of physical health conditions (Hawton et al., 2002; VanderWeele et al., 2016; Davidson et al., 2019; Wei and Mukamal, 2019; Davidson et al., 2020a; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020; Choflet et al., 2021; Davidson et al., 2021a; Davidson et al., 2021b). NVDRS data showed that female, but not male nurses, were more likely to have a physical health problem than controls who had died by suicide (Davidson et al., 2020a; Choflet et al., 2021). However, UK data showed that male, but not female nurses, were more likely to have physical illness in the year prior to death than non-nurses (The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020), and another study showed no difference in prevalence between living nurses and nurses who had died by suicide (Hawton et al., 2002). Within law or medical examiner narratives of American nurses who died by suicide, 26.0 % cited pain and health issues, with some being work-related injuries (Davidson et al., 2021b). Data from the Nurses' Health Study I and II explored the contribution of specific conditions and multi-morbidity (existence of co-existing health conditions) to suicide risk among female nurses. Hypertension, high cholesterol, diabetes, and cancer were not individually associated with female nurse suicide risk (VanderWeele et al., 2016). However, multi-morbidity of health conditions was strongly associated; female nurses in the highest quartile of multi-morbidity had approximately 2–3 times higher suicide risk than those in the lowest (Wei and Mukamal, 2019).

3.1.2.5. Occupational factors. Ten studies examined occupational links to suicide (Hawton et al., 2002; Kõlves and De Leo, 2013; VanderWeele et al., 2016; Davidson et al., 2019; Davidson et al., 2020a; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020; Wolf et al., 2020; Choflet et al., 2021; Davidson et al., 2021a; Davidson et al., 2021b). In one study, nurses who died by suicide had less experience of nursing than living controls (Hawton et al., 2002). Studies in the USA (Davidson et al., 2020a; Choflet et al., 2021), and another examining female nurses (with mental health service contact within last 12 months) in the UK (The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020), showed that nurses were more likely to have job problems than decedents by suicide in the general population. However, there was a lower prevalence of job problems in nurses in Queensland than in doctors and education professionals who died by suicide (Kõlves and De Leo, 2013). The specific nature of the problems was not defined in these studies. While nurses in England and Wales were no more likely than living nurses to have occupational problems, work overload, conflict, and feeling unsupported were frequent problems in the year prior to suicide (Hawton et al., 2002).

In law enforcement or medical examiner work-related narratives of 203 American nurses who died by suicide, occupational issues were often related to actual or potential job loss (92 %), occurring for multiple reasons, such as investigation, illness, and absenteeism (Davidson et al., 2021b). The authors identified largely modifiable issues related to job loss, namely pain, mental health problems, and substance misuse.

3.1.2.6. Interpersonal factors. Ten studies examined interpersonal factors (Hawton et al., 2002; Kõlves and De Leo, 2013; Tsai et al., 2015; VanderWeele et al., 2016; Davidson et al., 2019; Davidson et al., 2020a; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020; Choflet et al., 2021; Davidson et al., 2021b; Davis et al., 2021). In the Nurses' Health Study, higher social integration scores (assessed by marital status, social network size, and frequency of social contact) were associated with decreased suicide risk among female nurses (Tsai et al., 2015). Furthermore, having no confidant, living alone, and single marital status were more common in nurses who died by suicide than living nurses (Hawton et al., 2002). American nurses were less likely to be married than physician decedents (Davis et al., 2021), while marital status was no different compared to suicide decedents in the British general population (The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020). Although relationship problems, including with partners, were no more common than in living nurse controls or the general population who died by suicide (Hawton et al., 2002; Davidson et al., 2020a), such problems were often suggested as contributory to suicide (Hawton et al., 2002; Kõlves and De Leo, 2013; Davidson et al., 2021b). No evidence was found regarding associations between bereavement, including by suicide, and risk (Hawton et al., 2002; Davidson et al., 2020a; Choflet et al., 2021). However, in some cases bereavement was described as a 'last straw' event (Davidson et al., 2021b).

3.1.2.7. Additional factors. Six studies examined financial factors (Hawton et al., 2002; VanderWeele et al., 2016; Davidson et al., 2019; Davidson et al., 2020a; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020; Davidson et al., 2021b). One American study examining income level found no association with suicide risk (VanderWeele et al., 2016) and nurses who died by suicide were no more likely than people dying by suicide in the general population to have financial problems (Davidson et al., 2020a; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020). However, financial problems have been identified as contributing to suicide in nurses; for example, financial strain due to job loss (Davidson et al., 2021b). Also, financial problems were more common in nurses who died by suicide than living nurse controls (Hawton et al., 2002). Recent legal issues were no more common among American nurses than individuals from the general population who died by suicide (Davidson et al., 2020a).

Two high quality studies examined the association between religious service attendance and suicide using data from the Nurses' Health Study (I and II) cohorts (VanderWeele et al., 2016; Chen et al., 2020). Female nurses who attended a religious service at least once a week had almost a five-times lower suicide risk than nurses who never attended services (VanderWeele et al., 2016). No difference was found for nurses

attending less than once a week. Mediation analyses did not provide an explanation for this protective effect.

3.1.3. Suicide methods

Method of suicide was reported in 21 studies (Kawachi et al., 1996; Hawton et al., 2002; Agerbo et al., 2007; Skegg et al., 2010; Hawton et al., 2011; Kõlves and De Leo, 2013; Tsai et al., 2015; Milner et al., 2016; Pilgrim et al., 2017; Davidson et al., 2018a; Ke et al., 2018; Zeng et al., 2018; Wei and Mukamal, 2019; Davidson et al., 2019; Guseva Canu et al., 2019; Davidson et al., 2020a; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020; Choflet et al., 2021; Davidson et al., 2021a; Davidson et al., 2021b; Davis et al., 2021). These consistently showed that suicide in nursing professionals most commonly involves self-poisoning (Kawachi et al., 1996; Hawton et al., 2002; Tsai et al., 2015; Wei and Mukamal, 2019; Guseva Canu et al., 2019), this being more likely than in the general population or other occupational groups (Agerbo et al., 2007; Skegg et al., 2010; Hawton et al., 2011; Kõlves and De Leo, 2013; Milner et al., 2016; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020; Davidson et al., 2018a; Davidson et al., 2019; Davidson et al., 2020a; Davis et al., 2021). In a Danish study the excess risk of suicide in nurses relative to educational professionals was statistically related to greater use of self-poisoning (Agerbo et al., 2007). Three studies found greater use of self-poisoning for suicide in female than male nurses (Hawton et al., 2011; Davidson et al., 2020a; The National Confidential Inquiry into Suicide and Safety in Mental Health, 2020). In America, however, firearm use among female nurses may be increasing: between 2003 and 2013, female nurses were significantly less likely than other females to use firearms, whereas between 2014 and 2017, firearm suicide rates increased to general population levels (Davidson et al., 2021a).

Multiple studies have examined substances used for self-poisoning by nurses who died by suicide. Across studies, antidepressants, opiates, sedatives (e.g., benzodiazepines), antihistamines, analgesics, and paracetamol (acetaminophen) were commonly used. For example, nurses in the USA were more likely to have tested positive on toxicology at the time of death for almost all substance classifications than non-nurses, with large differences regarding opioids (44.6 % nurses, 11.8 % non-nurses), antidepressants (44.0 % vs 9.4 %), benzodiazepines (43.6 % vs 11.0 %), alcohol (42.1 % vs 13.0 %), and antihistamines (16.3 % vs 5.5 %) (Choflet et al., 2021). However, relatively few cases were identified where substances were taken from a hospital. In a series of nursing suicides in England and Wales, insulin was used in three cases and an anaesthetic agent in another, with the medication having been taken from the workplace in all four cases (Hawton et al., 2002). One study found prescription medications used for suicide, such as antidepressants, could also be taken from the workplace (Pilgrim et al., 2017).

3.2. Non-fatal suicidal behaviour and suicide ideation

Thirty-six studies examining non-fatal suicidal behaviour or ideation were identified. Specifically, these included suicide attempts (k = 12) (Samuelsson et al., 1997; Ramberg and Wasserman, 2000; Braquehais et al., 2016; Cheung et al., 2016; Davidson et al., 2018b; Norcross et al., 2018; Davidson et al., 2020b; Freire et al., 2020; Olibamoyo et al., 2020; Stelnicki et al., 2020; Arafat et al., 2021; Karakaya et al., 2022), self-harm (k = 5) (Cheung et al., 2016; Cheung and Yip, 2016; Cheung and Yip, 2017; Davidson et al., 2018b; Davidson et al., 2020b), and suicide ideation (k = 31) (Diggs and Lester, 1996; Samuelsson et al., 1997; Carta et al., 2000; Ramberg and Wasserman, 2000; Fagnani Neto et al., 2004; Yildirim and Yildirim, 2007; Chung et al., 2012; Shakya et al., 2012; Sánchez Núñez et al., 2014; Cheung et al., 2016; Loerbroks et al., 2016; Giacchero Vedana et al., 2017; Davidson et al., 2018b; Durmus et al., 2018; Dyrbye et al., 2018; Norcross et al., 2018; Stephenson, 2018; Chin et al., 2019; Damirchi et al., 2019; Davidson et al., 2020b; Stelnicki et al., 2020; Wang et al., 2020; Wolf et al., 2020; Xu et al., 2020; Arafat et al., 2021; Kelsey et al., 2021; Soravia et al., 2021; Stovall and Hansen, 2021; Václavíková and Kozáková, 2021; Karakaya et al., 2022; Wei et al., 2022). Studies were conducted in Asia (k = 11), Europe (k = 6), North America (k = 10), the Middle East (k = 4), South America (k = 3), and Africa (k = 2). Most studies collected data by self-report (k = 34) and were of moderate (k = 15) or low quality (k = 13), with fewer of high quality (k = 8).

3.2.1. Self-harm and suicide attempts

3.2.1.1. Prevalence. The prevalence of self-reported past-year suicide attempts ranged from 0.7 % in Canadian nurses (N = 3969) (Stelnicki et al., 2020) to 2.9 % in nurses in Hong Kong (N = 850) (Cheung et al., 2016), with 9.3 % of the latter sample reporting self-harm in the previous year (Cheung and Yip, 2016).

3.2.1.2. Contributory factors. Two moderate quality studies explored characteristics of nurses stratified by self-reports of suicide ideation and behaviour (Cheung et al., 2016; Stelnicki et al., 2020). When nurses from Hong Kong who reported having attempted suicide in the past year were compared with nurses with past year ideation but no attempts, the former were more likely to report chronic illness, symptoms of anxiety and stress, debt, and previous self-harm (Cheung et al., 2016). Among Canadian nurses, depression, anxiety, and panic disorder were associated with past-year ideation, plans, and attempts, whereas PTSD was associated with ideation and plans only. Alcohol use disorder was associated with ideation and attempts (Stelnicki et al., 2020).

3.2.1.3. Self-harm and suicide attempt methods. Two studies examined methods of non-fatal suicidal behaviour. All nurses admitted to a Spanish inpatient mental health ward had used psychotropic drugs to self-poison. Over a quarter also used non-psychotropic drugs (Braquehais et al., 2016). Of nurses surveyed in Hong Kong, cutting, hitting, and poisoning were the most frequent self-harm methods (Cheung and Yip, 2016).

3.2.2. Suicide ideation

3.2.2.1. Prevalence. Measurement of ideation varied across studies by assessment tool used and time-period of measurement. One high quality study found significantly greater odds of nurses experiencing suicide ideation than aged-matched other workers (Kelsey et al., 2021) However, studies comparing prevalence of ideation to other healthcare professionals had mixed findings (Ramberg and Wasserman, 2000; Fagnani Neto et al., 2004; Xu et al., 2020; Soravia et al., 2021; Wei et al., 2022).

3.2.2.2. Contributory factors. Findings of high-quality studies found links between suicide ideation and both depression (Wang et al., 2020; Kelsey et al., 2021) and burnout (Chin et al., 2019; Kelsey et al., 2021). Burnout, both personal and patient-related, alongside stress at work was related to suicide ideation, accounting for 19.4 %, 8.6 %, and 10.5 % of population attributable risk, respectively, among nurses in Taiwan (Chin et al., 2019). Nurses in China with sleep problems were more likely to report suicide ideation, with the problem subtype "*cannot breathe comfortably*" independently related to ideation (Wang et al., 2020). A cumulative effect was observed, where the more types of sleep problems reported, the higher the likelihood of ideation. Mixed findings were found regarding sociodemographic (e.g., age) and occupational characteristics (e.g., hours worked), although one American study found links between patient-safety incidents resulting in deaths of patients and nurses' reports of probability of a future suicide attempt (Stovall and Hansen, 2021). However, suicide ideation itself was not related.

3.2.2.3. Protective factors. Evidence related to potential protective factors included learned resourcefulness both mediating and moderating

the relationship between depressive symptoms and positive ideation (a suicide protective factor stated within the Positive and Negative Suicide Ideation Inventory (Osman et al., 2002)) among Taiwanese nurses (Chung et al., 2012). Help-seeking by nurses was explored in two studies. American nurses with suicide ideation were less likely to seek help than other nurses (Kelsey et al., 2021). Among another sample of American emergency nurses (some of whom reported suicide ideation in themselves or colleagues), perceptions of appearing weak, or fear of suggesting patient care may be compromised, were reported barriers to help-seeking at work (Wolf et al., 2020).

3.3. Suicide risk

Six studies examined suicide risk (Pompili et al., 2006; Sánchez Núñez et al., 2014; Davidson et al., 2018b; Braquehais et al., 2020; Davidson et al., 2020b; Freire et al., 2020). Quality of studies were mostly low (k = 4), with two high-quality studies. Suicide risk of Brazilian nurses was no different to physicians (Freire et al., 2020). Additionally, a study in Mexico found associations between suicide risk and both smoking and depression (Sánchez Núñez et al., 2014).

3.4. COVID-19

We identified 17 studies which examined suicidal thoughts and behaviours among nurses during the COVID-19 pandemic (Ariapooran and Amirimanesh, 2020; Robles et al., 2020; Shen et al., 2020; Campo-Arias et al., 2021; Greenberg et al., 2021; Hong et al., 2021; Jahan et al., 2021; Mortier et al., 2021; Tamrakar et al., 2021; Xu et al., 2021; Ariapooran et al., 2022; Bismark et al., 2022; Hendrickson et al., 2022; Kantorski et al., 2022; Lixia et al., 2022; Ma et al., 2022; Mortier et al., 2022). Studies were conducted in Asia (k = 6), Europe (k = 3), the Middle East (k = 2), North America (k = 2), South America (k = 2), and Oceania (k = 1). One article covered worldwide reports. The majority of studies (k = 14) were cross-sectional surveys, including one baseline assessment of a prospective cohort. Quality of studies varied: high (k = 5), moderate (k = 7), and low quality (k = 5).

Eleven studies compared prevalence of suicide ideation or suicide risk to other healthcare professionals, with mixed findings (Robles et al., 2020; Campo-Arias et al., 2021; Greenberg et al., 2021; Mortier et al., 2021; Xu et al., 2021; Bismark et al., 2022; Hendrickson et al., 2022; Kantorski et al., 2022; Lixia et al., 2022; Ma et al., 2022; Mortier et al., 2022). Two studies conducted with Iranian nurses found single marital status, education below a master's degree, and secondary traumatic stress were associated with suicide ideation (Ariapooran and Amirimanesh, 2020; Ariapooran et al., 2022). Sex and hospital department were not. Among nurses working on the COVID-19 frontline in China, suicide ideation was associated with perceived lack of support from family or hospital authorities, poor health, and less opportunities for sharing opinions via the mass media (Hong et al., 2021). Feeling discriminated against due to caring for patients with COVID-19 during the pandemic was not associated with suicide risk among registered nurses in Colombia, despite correlations being found in nursing assistants and physicians (Campo-Arias et al., 2021). Use of psychotropic medication was associated with suicide ideation among Brazilian nursing professionals (including nursing assistants and technicians). All COVID-related factors showed no association (Kantorski et al., 2022). Only depression was associated with ideation among a sample of American nurses (Hendrickson et al., 2022). Factors identified across studies as protective against ideation included lower job stress, family members not having COVID-19 (Hong et al., 2021) and high income (Kantorski et al., 2022).

3.5. Interventions

Three studies described interventions related to prevention of suicidal behaviour in nurses, all of which were based on the Healer Education Assessment and Referral (HEAR) suicide prevention program in the USA (Davidson et al., 2018b; Norcross et al., 2018; Davidson et al., 2020b). The studies described the first six (Davidson et al., 2018b) and 12 months (Norcross et al., 2018), with the most recent reporting outcomes over three years (Davidson et al., 2020b). The intervention consists of three components: an educational element, proactive anonymous screening of risk, and counselling with referral to treatment (Davidson et al., 2020b). All studies were rated as low quality, this being predominately due to the exploratory nature of the intervention.

Across the three years of screening, 9573 nurses were invited, of which 527 (5.5 %) completed. Of these, 176 spoke to a counsellor, and 98 received a referral for treatment. Most referred nurses had reported suicidal thoughts or behaviours. Of screening completers, 48.2 % (N = 253) were rated as at high risk, indicating high levels of distress: in the past two weeks 9.1 % reported suicide ideation and 1.7 % hurting themselves, and 9.7 % had attempted suicide at some time. Common stressors reported within the questionnaire included "workload, lateral violence ('*acts of incivility in the workplace*' e.g., bullying (Davidson et al., 2015)), understaffing, feeling unappreciated, and feeling ill-prepared," (Davidson et al., 2020b). Occupational issues caused stress at home, sleep disturbances, psychiatric disorders, and relationship strain. Additional distress was caused by needing to choose between work, self-care, and family.

4. Discussion

4.1. Summary of main findings

In this systematic review we have identified articles examining suicidal thoughts and behaviours among nurses and midwives. Prevalence, contributory and protective factors, and prevention-based interventions were explored. Overall, quality of studies examining suicide were moderate to high, with American longitudinal epidemiological and cohort studies being particularly informative.

There is substantial evidence that nursing professionals have an increased risk of suicide relative to the general population and some other occupational groups. The weight of evidence indicates risk is particularly elevated in female nurses. Challenges balancing work and home-related responsibilities may be contributory; women undertake most of unpaid care work, equating to almost 4.5 h/day (International Labour Organization, 2018) When coupled with excessive working hours faced by nurses (e.g., Rogers et al., 2004), negative consequences for nurses' wellbeing may occur.

The temporality of increased suicide risk is not known. For example, the nursing profession may attract individuals who have underlying characteristics related to suicide risk (e.g., some psychiatric nurses enter the role due to personal experiences of mental illness (Oates et al., 2018)), or the role may introduce issues contributing to risk. Data examining receipt of psychological support or psychotropic prescription should be analysed to explore whether difficulties begin prior to or during training, or throughout qualified practice.

The findings of the studies included in the review indicate that a complex range of factors may contribute to suicide in nurses. Although some factors may not be unique to nurse suicide, they are nonetheless important for prevention in this occupational group. There is evidence of a link between suicide risk in nurses and both psychiatric conditions and prior suicidal behaviour, as is found for the general population (Geulayov et al., 2019; San Too et al., 2019). Evidence suggests that nurses are more likely to have received or be receiving psychological support before suicide than other groups. While this may suggest that support and treatment for nurses experiencing mental health conditions could be improved, it could also indicate greater willingness to seek help. The common use of antidepressants as a method of self-poisoning highlights the need to ensure that where these are indicated, medication with low toxicity should be prescribed. Furthermore, monitoring for suicidal thoughts and behaviours should be undertaken after prescription,

alongside use of evidence-based psychosocial interventions (Witt et al., 2021; National Institute for Health and Care Excellence, 2022).

As in the general population (Yuodelis-Flores and Ries, 2015; Amiri and Behnezhad, 2020), substance misuse, particularly of alcohol, appears to be a risk factor for suicide among nurses. Reasons for misuse by nurses has been examined widely, with workload and work-related stress, lateral violence, traumatic workplace events, need for a sleep aid or deterrent, and physical and mental health conditions all suggested as drivers (e.g., Ross et al., 2018; Foli et al., 2021). Nursing professionals may be less likely than members of some other professions to seek support due to underlying stigma surrounding substance misuse, normalisation to cope with work pressures, and fear of regulatory consequences (Cares et al., 2015; Ross et al., 2018). Conversely, consumption of caffeinated coffee was shown to be associated with a protective effect. This may reflect some nurses having the opportunity for rest breaks, which are related to better physical and mental health among nurses (Wendsche et al., 2017) and may promote social support.

Studies identified in the review indicated physical health conditions, including pain and multi-morbidity, may be contributory to suicide in nurses, alike the general population (Ahmedani et al., 2017; Racine, 2018; Stickley et al., 2020). Chronic pain, particularly musculoskeletal pain, is common in nurses (Fronteira and Ferrinho, 2011). This may be due to the physical demands of the occupation. Reasons why physical health conditions may contribute to suicide in nurses have not been widely explored. Mixed-methods investigations (Davidson et al., 2021a; Davidson et al., 2021b) showed that pain (at times resulting from occupation-related injury) may lead to additional risk factors, including substance misuse and psychiatric comorbidity. Indeed, depression and musculoskeletal pain commonly co-occur in nurses (Zhang et al., 2020).

Occupational issues appear to have both direct and indirect influences on suicide risk, perhaps supported by evidence showing suicide rates are lower around retirement age. Directly, job-loss has been implicated as contributory, and indirectly, occupational difficulties may act as an underlying thread, increasing vulnerability to several risk factors, including physical and psychiatric conditions, substance misuse, and interpersonal problems, all of which have been shown to increase suicide risk in the general population (San Too et al., 2019; Geulayov et al., 2019; Amiri and Behnezhad, 2020; Yuodelis-Flores and Ries, 2015; Racine, 2018).

The included studies highlighted the frequency of self-poisoning as a method of suicide in nurses. Alone, this would support the '*availability of means*' hypothesis, where access to lethal methods may explain increased risk among certain occupations, as previously suggested for anaesthetists (Plunkett et al., 2021) and veterinary surgeons (Platt et al., 2010). However, this method of suicide in nurses commonly involves prescribed medication, such as antidepressants. Reasons may include high prevalence of physical and mental health conditions increasing availability of medication, knowledge of lethal levels, and cognitive availability of medication due to workplace exposure. Future research should examine whether medication used for self-poisoning was prescribed and reasons for prescription. Where records indicate a substance has been taken from a nurses' workplace, research should explore whether this was indicative of substance misuse (e.g., medication taken multiple times), or solely for acquisition of the drug for suicidal behaviour, as well as whether the substance was a controlled item (likely to be tightly monitored within the workplace), or prescription medication (which may be accessed without such strict monitoring).

It was unclear whether suicide rates or behaviours changed among nurses during the COVID-19 pandemic. An area for further consideration is the impact of 'Long COVID'. A German study of previously infected healthcare workers found half experienced symptoms for at least nine months (Peters et al., 2022). There are concerns that 'Long COVID' might be a suicide risk factor (Sher, 2021).

4.2. Implications

This review has identified potentially modifiable factors which could be targets for suicide prevention efforts in nurses. The high levels of primary care or psychiatric service contact prior to suicide provides an opportunity for identification of at-risk nurses and delivery of prevention-based interventions. This should include an initial psychosocial assessment examining known risk factors among nurses, for example physical and mental health needs, previous suicidal behaviours, interpersonal difficulties, substance misuse, and occupational issues.

Implementation of workplace and university-based prevention strategies should be considered. Initiatives could include ongoing educational opportunities regarding safe-handling procedures including the potential psychological effects of physical health problems, alongside education about the importance of workplace wellbeing and recognising and managing substance misuse and mental health problems. Clinical supervision should be available for all nurses, together with implementation of interventions to provide nurses and nursing students with the space to share, reflect, and attend to the emotional and psychological impacts of care. Schwartz Rounds (Schwartz, 1995) (which provide an opportunity for staff to reflect on the emotional aspects of work) within nursing workplaces and universities have gained momentum in the USA and UK (Jakimowicz and Maben, 2020) and may provide such an opportunity, although evidence for effectiveness is currently limited (Taylor et al., 2018). Efforts should be made to address stigmatisation of substance misuse and psychiatric difficulties, including encouraging and normalising talking about emotional distress. This may include the implementation of peer-support to foster social support and integration. Finally, strategies to equip nursing students with skills to enhance their emotional wellbeing throughout practice should be considered. However, there is currently only modest evidence for effectiveness of 'resilience' training, with little to no evidence for impact on depression (Kunzler et al., 2022). Additional strategies to promote wellness in practicing nurses and associated students should be developed and evaluated.

Suicide risk screening has been implemented within the nursing workplace (e.g., Davidson et al., 2020b). Screening may provide an opportunity to identify and support individuals at risk, whilst overcoming stigma-based barriers associated with accessing support (Davidson et al., 2020b). However, despite anonymity, nurses may be suspicious, particularly if concerned about job loss. This may be another explanation for the low completion rate for screening procedures. Given the large international nursing workforce (approximately 27 million (World Health Organisation, 2022)), implementation of screening may not be feasible. Alternative resources should be explored, for example digital means to facilitate self-screening and signposting, together with resources providing advice and support.

It is striking that 92 % of American nurses with occupation-related issues prior to suicide had either lost or were in the process of losing their position (Davidson et al., 2021b). Nurses may prematurely leave their profession due to physical and mental health difficulties, and because of being under investigation (Davidson et al., 2021b; Nursing and Midwifery Council, 2022). The period around leaving nursing may increase vulnerability. Adjustments and support in working arrangements should be reviewed to ensure nurses are appropriately supported, including where medical retirement is required. Attention should be paid to procedures experienced by nurses who are under investigation or have been dismissed (Davidson et al., 2021b). Concerns about suicide among doctors linked to fitness to practice processes in the UK resulted in review of investigation procedures and subsequent improvements (General Medical Council, 2020). A review of processes surrounding nurse fitness to practice assessments should examine how procedures can be improved.

Several implications for future research are suggested by the findings of this review. Many studies examined factors related to suicide without

exploring reasons for associations. Mediator and moderator analyses would facilitate exploration of complex factors associated with risk. Most studies were cross-sectional or retrospective. The development of additional national prospective cohorts of nurses would facilitate exploration of multiple factors that contribute to suicide risk, for example, career level (student, registered, retired) or specialism (nurse, midwife, specific specialities). We found little evidence of qualitative research concerning suicidal behaviour among nursing professionals who have attempted suicide or self-harmed. Such research would allow holistic exploration of complex interactions regarding contributory factors to suicidal behaviour, as well as exploring the experiences of nurses with suicide ideation, and experiences of coping and recovery. Finally, research has focused on suicide rates of nurses according to binary sex, without examining gender. Exploring risk across the gender spectrum is warranted given findings showing increased suicide ideation of non-binary healthcare professionals during COVID-19 (Bismark et al., 2022).

The paucity of interventions designed for suicide prevention highlights the need for additional approaches to be developed and evaluated for both qualified nurses and nursing students. Approaches should be co-produced with nurses and nursing students including those who have experienced suicidal thoughts and behaviours. Interventions should follow guidance for complex intervention development, for example from the UK Medical Research Council (Skivington et al., 2021). Potential evidence-based interventions and metrics for intervention evaluation have been identified by the American Hospital Association (2022). Suggested interventions are based on targeting stigma associated with seeking support, access to education, resources, and treatment options, and targeting job-related stress. Both the above guidance and a report by the U.S. Surgeon General (2022) recommend the implementation of suicide prevention approaches across the healthcare workplace (e.g., the HEAR programme).

4.3. Strengths and limitations

The use of a thorough search strategy and data extraction method, alongside tailored quality assessment, facilitated a comprehensive review. Investigations from many countries were identified, including those classified as lower and middle income, for which suicide data are often lacking. Although care was taken to include studies of nurses registered to practice, sometimes the definition of 'nursing professionals' was unclear. Furthermore, it was not always clear whether midwives were included within studies. This aligns with current debate over protection of the nurse title (Bourgault, 2021). A standardised definition of 'nurse' would improve comparability of findings. The search was limited to articles published within the academic literature. Relevant data outside of this field may have been missed, for example, data from the American Nurses Foundation (2021). Further exploration of the non-academic literature may be valuable.

5. Conclusion

Recent research continues to show that nursing professionals, especially females, are at increased risk of suicide, warranting further research attention. Multiple additive factors appear to be contributory to risk, including occupational, psychiatric, substance-misuse, and physical health factors. Establishment of longitudinal cohorts of nurses and midwives would allow the complex phenomena associated with their suicidal behaviour to be explored. Prevention-based interventions alongside improved psychological support for nursing staff should be developed and evaluated.

CRediT authorship contribution statement

KH, SG and KL were responsible for study conception and design, and interpretation of the results. SG conducted database searches and handsearching. SG and KL assessed studies for eligibility with input from KH where required. SG extracted and synthesised the data with support from KL and KH. SG drafted the report, which all authors critically revised for intellectual content. All authors approved the final report and are accountable for all aspects of this work.

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Neither NHSE or the Department of Health and Social care had any role in study design, data collection, analysis, and interpretation of data, or in the writing of the report, and in the decision to submit the paper for publication.

Conflict of interest

KH declares grants from the National Institute for Health Research and the Department of Health and Social Care. He is a member of the National Suicide Prevention Strategy for England Advisory Group and is a National Institute for Health Research (NIHR) Senior Investigator (Emeritus).

All other authors declare no competing interests.

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Appendix A. Supplementary data

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