A Systematic Review of Yoga Interventions on the Mental Health of Nursing Professionals and Students

Abstract

This systematic review aimed to evaluate the impact of yoga interventions on preventing and alleviating mental health issues, including stress, anxiety, burnout, depression, and other related factors among nursing professionals and students. The review adhered to the PRISMA guidelines and was registered in PROSPERO (CRD42024512366). A comprehensive literature search was conducted in Google Scholar and PubMed using keywords such as "nursing students," "nursing professionals," "yoga interventions," and "mental health." Eligible studies were randomized controlled trials (RCTs) published from 1st January 2014 to 31st December 2024, involving nursing population and yoga-based interventions targeting mental health outcomes. The risk of bias was assessed using the CASP tool. The search identified 14 RCTs (967 participants, predominantly female, age range - 18 to 69 years) that met the eligibility criteria. The yoga intervention varied in duration (10 minutes to 1 hour per session), frequency (once to five times weekly), and protocols (Laughter yoga being the most common). Mental health outcomes such as stress, anxiety, burnout, mindfulness, depression, quality of sleep, and life satisfaction were assessed. Most studies reported significant improvements in these outcomes in the yoga intervention groups compared to control groups. Nine studies showed a significant stress reduction, and 3 studies found a decrease in anxiety. No adverse effects were reported, and dropout rates varied between 0% to 52.1%. Yoga was found to be effective in improving mental health and well-being among nursing professionals and students. Yoga mainly reduced stress, anxiety, burnout, and depression, suggesting its potential as a low-cost, accessible intervention for mental health management in this population. Future studies should focus on refining protocols and exploring long-term effects to establish yoga as an integral part of mental health care for nursing professionals and students.

Keywords: *Anxiety, burnout, depression, mental health, nursing professionals, nursing students, randomized controlled trial, stress, systematic review, yoga*

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Introduction

Nurses, with a workforce of approximately 6 million, form the backbone of the healthcare delivery system in India.[1] After enrolling in nursing programs, students transition into professional roles through employment in hospitals and clinics. In this phase, they encounter numerous challenges in clinical settings, as their responsibilities are heavily centered on patient care.[2,3] Given the complexities of disease conditions, patients often respond unpredictably to nurses, who must manage these situations while providing critical care and supporting patient recovery. These demands can lead to significant mental exhaustion, and without effective coping mechanisms, nurses are at risk of developing various mental health issues.

A recent survey conducted in 2023 involving 13,867 psychiatric nurses across 41 hospitals reported alarming rates of mental health problems: burnout was prevalent in 38.6% of participants, while depression, anxiety, and stress affected 26.3%, 36.4%, and 12.5%, respectively.[4] Similarly, in China, a retrospective analysis of 730 nurses from 2018 to 2020 revealed that night shift work significantly contributed to chronic conditions such as poor sleep quality, depression, high uric acid levels, triglycerides, and even breast cancer.[5-8]

Nursing students are also particularly vulnerable to mental health challenges. Research indicates that mental health

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issues are particularly prevalent among nursing professionals and students (NPS).[9,10] A meta-analysis of 42 studies involving 14,894 nursing students found that they frequently experience bullying (38.8%), physical aggression (10.2%), and sexual aggression, predominantly perpetrated by patients (64.2%) and physicians (18.6%) during their clinical placements.[11] Such exposure to hostile environments places them at high risk for mental health deterioration.[12] Despite the increasing awareness of these challenges, recent comprehensive analyses highlight a critical gap in effective mental health interventions tailored specifically for nurses and nursing students.[13,14] Various therapeutic approaches, such as cognitive behavioral therapy, mindfulness therapy, and others, are commonly used to address these challenges. While these therapies are effective in the short term, they often lack the long-term benefits of a holistic approach to health. Yoga, in contrast, follows the panch kosha principle, which addresses physical, pranic, mental, cognitive, and spiritual health,[15] offering a more comprehensive approach.

Yoga, an ancient mind–body practice, has shown promise in enhancing mental resilience. Several systematic reviews have highlighted its beneficial effects on healthcare professionals, including nurses, physicians, psychologists, and paramedics, among others.[16-20] Most studies agree that yoga is an effective approach to managing both physiological and psychological issues.[16,19] For instance, Dutta *et al*.[19] reported that yoga improves the quality of life and physical fitness in patients with chronic heart failure, while Mishra *et al*.[20] demonstrated its potential as a complementary intervention for various chronic inflammatory conditions.

Yoga has proven beneficial for managing chronic health conditions in NPS and is emerging as a complementary treatment. Numerous studies highlight yoga's positive impact on psychological health in both healthy and diseased populations.[21-25] A 2016 bibliographic analysis confirmed yoga's effectiveness for a range of mental and physical health issues,[26] and a 2021 systematic review of 25 studies emphasized yoga's benefits for health professionals and students across diverse environments.[16] Cohen's 2023 systematic review of 33 studies found that workplace interventions, including yoga, improve well-being, engagement, and resilience, and reduce burnout among healthcare workers.[27] Despite this, there has been no rigorous review focused on yoga's impact on the mental well-being of NPS. This systematic review seeks to fill that gap by summarizing research on the potential benefits of yoga in improving mental health outcomes for NPS. Although the mental health burden among NPS is well-documented, systematic reviews on mental health interventions have primarily focused on physicians and general healthcare workers,[28,29] with limited attention to NPS specifically. This systematic review addresses this gap by exploring the effects of yoga interventions on the mental health of NPS, offering a novel perspective in the domain of their mental heath and well-being.

Aim

This study aimed to evaluate the impact of yoga interventions on the prevention and alleviation of mental health issues, including stress, anxiety, and depression, among NPS.

Methods

The present systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines.[30] The review protocol was registered in the PROSPERO database under the registration number CRD42024512366.

Search strategy

All authors finalized the keywords after a thorough discussion. Subsequently, two authors (RGA and M) developed the search strategy by extensively exploring relevant publications on the topic. Any disagreements were resolved by consulting three other authors (DBR, DS, and HB). From January 18, 2024 till February 18, 2024, the Google Scholar and PubMed electronic databases were thoroughly searched using the terms "nursing students," "nursing professionals," "yoga interventions," and "mental health." In addition, manual and snowball search techniques were employed to ensure that no relevant articles were overlooked. After the literature search, two authors (RGA and M) independently reviewed the abstracts and examined potentially suitable full articles to ensure they met the eligibility criteria.

Study selection process

The two authors (RGA and M) independently conducted the study selection procedure. Any uncertainties in the study selection process were discussed with three other authors (DBR, DS, and HB). All five authors (RGA, DBR, DS, M, and HB) reached a consensus on the final inclusion and exclusion criteria. Duplicates were removed using the Zotero database. After duplication removal, the remaining articles were screened based on the eligibility criteria. Full-text articles were then obtained for all qualifying studies. For those whose full text was not accessible, RGA and M contacted the journals and authors to request the full text. The full-text articles were rescreened using the same eligibility standards. A second screening of the rejected full-text articles was performed to ensure that no relevant studies were overlooked. DBR and DS screened the records independently, with one author screening and the other reviewing the decisions. HB evaluated the overall quality of the studies while remaining blind to the conclusions of the other authors. Due to insufficient and inconsistent data, a meta-analysis was not conducted.

Study design

This review included quantitative research studies, specifically prospective randomized controlled trials (RCTs), that employed either invasive or noninvasive methods for data collection.

Inclusion and exclusion criteria

The study question was developed using the PICO technique, which stands for Population, Intervention (design), Control, and Outcome.[31] Included studies were required to meet the following criteria: they must identify "yoga" as the intervention,[32,33] including asanas, relaxation practices, breathing exercises, pranayama, and meditation. Target nursing professionals or nursing students as the population; be randomized controlled clinical trials published between 2014 and 2024. In addition, studies must address mental health variables and be published in peer-reviewed English-language journals. Excluded studies were those that involved yoga combined with other multimodal interventions (e.g., yoga and Tai Chi), studies where the sample did not exclusively comprise nursing professionals or students, and studies with unavailability of full-text articles.

Study risk of bias assessment

The Critical Appraisal Skills Program (CASP) (https://casp-uk.net/casp-tools-checklists/) questions for RCTs were used to evaluate the studies included in this review. Studies were rated as high, moderate, or poor quality based on various factors such as selection bias, assessor blinding, handling of missing data, randomization quality (if applicable), and reporting procedures. RGA and M independently created tables, and after both reviewers reached an agreement, the final table of CASP items and results was finalized. DBR reviewed the research after the team completed the calibration exercise with the risk of bias tools, and the other reviewer, DS, validated the findings. Any disagreements were resolved by consulting a third reviewer (HB). Based on the CASP (RCT) guidelines, three studies[34-36] were classified as high quality, eight studies[37-44] as moderate quality, and three studies[45-47] as low quality. Table 1 provides an overview of the CASP quality assessments.

Data extraction

Two review authors (RGA and M) independently extracted the data using an Excel document designed according to PRISMA guidelines. The following information was extracted: author/publication year, population, sample size, gender, age-range and mean, yoga protocol, total duration of the study, frequency of the intervention, total number of yoga interventions per week, sample size (intervention group/control group), cognitive and psychological measurements, findings, attendance, dropout rates, and any adverse effects. Any discrepancies were resolved through consultation with additional authors (DBR, DS, and HB).

Table 1: Summary of critical appraisal skills program quality assessment for randomized controlled trials

Author	Clear focus?	Randomized assignment	All participants accounted for?	Blinding to treatment?	Groups similar at start?	Groups treated equally?	Size/ precision of treatment effect?	Applicable to local contact?	All important outcomes considered?	Do benefits outweigh harms/ costs?	Overall
Hilcove *et al.*, 2021a	✓	✓	✓	✓	-	✗	✗	-	-	✓	Moderate
Alexander *et al.*, 2015a	✓	-	✓	✗	✗	✗	✓	-	-	-	Low
Si S Çeli K and Kılınç, 2022	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	High
Dönmez *et al.*, 2023a	✓	✓	✓	✓	-	✓	✓	✓	✓	✓	High
Mandal *et al.*, 2021a	✓	✓	✗	✗	-	✓	-	-	✓	✓	Moderate
Ozturk and Tezel, 2021a	✓	✓	✓	✗	✓	-	✓	-	✓	✓	Moderate
Fang and Li, 2015a	✓	✓	✓	-	✓	-	✗	✓	-	✓	Moderate
Ozturk and Tekkas-Kerman, 2022b	✓	✓	✓	✗	✗	-	✓	-	-	✓	Low
Rostami and Ghodsbin, 2019a	✓	✓	✓	✗	-	-	✗	-	✓	✓	Moderate
Mathad *et al.*, 2017b	✓	-	✓	-	-	✓	✓	✓	✓	✓	Moderate
Kim, 2014a	✓	✓	✓	✗	✓	-	✗	✓	-	✓	Moderate
W.J *et al.*, 2021a	✓	-	✓	✗	-	✗	✗	-	✓	✓	Low
Miyoshi, 2019a	✓	✓	✓	✗	✓	✗	✗	✓	✓	✓	High
Patil *et al.*, 2018	✓	✓	✓	✓	✓	✗	✗	✓	-	✓	Moderate

✓: Yes, -: Unclear, ✗: No

Data items

The primary outcome variables of this review were mental health measurements, including stress, anxiety, depression, burnout, quality of life, mindfulness, sleep quality, life satisfaction, confidence, and other related factors.

Data synthesis

A narrative synthesis of the results was conducted and organized based on the characteristics of the target population, the intervention, and the outcomes. Narrative synthesis is a method that evaluates study evidence from a variety of sources to conclude.[48] This approach allowed us to focus on synthesizing the results rather than conducting a meta-analysis, which is recommended when the subject matter is new and lacks clarity.[48]

Results

Search results

From January 18, 2014, to February 18, 2024, an online literature search returned 18,710 results from the Google Scholar (18,604) and PubMed (116) databases. After removing duplicates and irrelevant publications, 18,597 studies were excluded. Of the remaining 113 studies, 80 were excluded based on the inclusion and exclusion criteria. An additional 19 articles were excluded for the following reasons: 2 studies had samples not exclusively consisting of nursing participants, 3 studies focused on data unrelated to the review topic, 4 studies lacked adequate evaluation, 5 studies had irrelevant outcomes, and 5 studies included interventions other than yoga. Ultimately, 14 RCT studies met the eligibility criteria and were included in this review to assess the impact of yoga interventions on the mental well-being of NPS participants [Figure 1]. To minimize reporting bias, only RCTs were included in this study.

Study characteristics and study quality

As shown in Table 2, all studies included in this review were RCTs focused on nursing professionals or nursing students, examining the effects of yoga on mental health-related outcomes. The majority of the studies were conducted in Turkey (n = 4), India (n = 4), and the United States (n = 2), and one study each was conducted in China, Korea, Japan, and Iran. Nine studies[34,36-38,40,41,44,45,47] targeted nursing professionals, while five studies[35,39,42,43,46] focused on nursing students. The total number of participants across all studies was 967, with ages ranging from 18-69 years, and 886 of them were female.

The duration of the yoga interventions varied widely, ranging from 10 min to 1 h per session, delivered over periods ranging from 4 weeks to 24 weeks, except in one study[35] that assessed an immediate impact of the intervention. In terms of frequency, yoga was delivered once weekly in two studies[43,45] twice weekly in five studies,[34,38-40,46] three times weekly in two studies,[36,41] 3–5 times weekly in two studies,[37,44] and regularly in the rest.[42,47] In addition, some studies incorporated home-based individual practice components, with nine interventions delivered offline and five delivered through DVDs, CDs, or online platforms.

The yoga protocols varied across studies, with laughter yoga (LY) being the most common approach[34,35,39,46] (n = 4), followed by mindfulness-based yoga[37] (n = 1), mahamantra yoga[47] (n = 1), restorative yoga[36] (n = 1), integrated yoga[42,44] (n = 2), and general yoga protocols[38,40,41,43,45] (n = 5). The control groups included participants who received no intervention[34,35,37-43,45-47] (n = 12), one study used a cross-over design,[36] and one study used physical activity as the control.[44]

Instructor qualifications were reported in five studies,[37-39,43,45] while in one study,[46] the corresponding author was directly

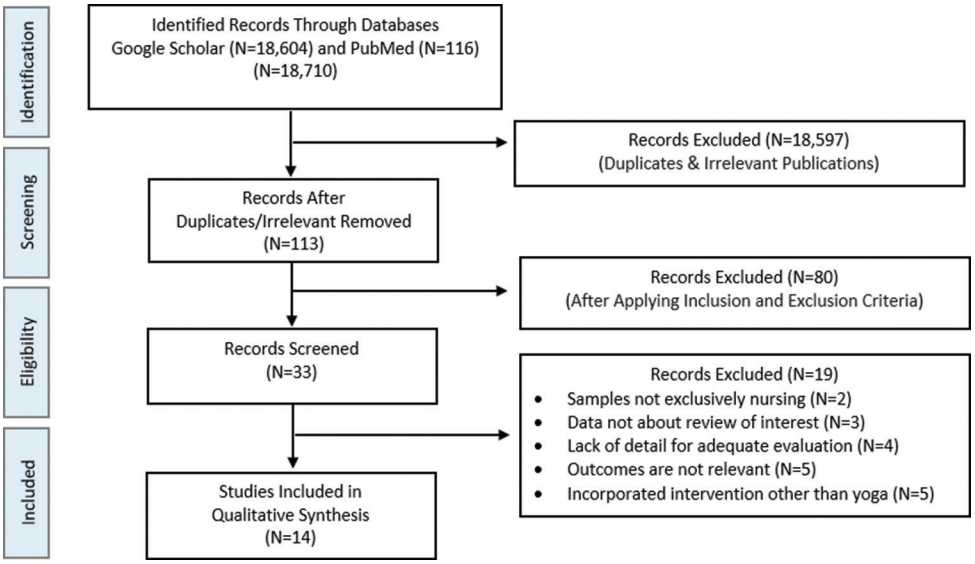

Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-Analysis flow diagram

Table 2: Fourteen randomized controlled trial studies

Author/year	Population	Sample (1038)	Gender	Age range/ mean (years)	Type of yoga	Yoga protocol	Number of participants in control group/ interverntion	Cognitive and psychological	Findings	Attendance	Drop out	Adverse effect
Hilcove *et al.*, 2021c	Nurses and HCPs	80	Male - 4 Female - 74	42.45	MB yoga practice	6-week MB yoga intervention, 3–5 times each week at home through DVD/CD	Intervention group – 41 Control group - 37	Perceived Stress Scale Maslach Burnout Inventory Vitality subscale of the Medical Outcomes Study Short Form–36 Global Sleep Quality item Mindfulness Awareness Survey Subscale of the Brief Serenity Scale Diurnal Salivary Cortisol	The MB yoga intervention used in this study had a statistically significant effect on the health and well-being of nurses and HCPs based on pre–post measures of perceived stress, burnout, vitality, sleep quality, rarity, and mindfulness	98.7%	2	No adverse effect
Alexander *et al.*, 2015c	Nurses	40	Male - 1 Female - 39	46.38	General Yoga (Basics of postural alignment, deep breathing, and monitoring the mind with simple meditations)	8-week yoga intervention, weekly session	Yoga group - 20 Control group - 20	HPLP FMI MBI	Yoga participants reported significantly higher self-care the control group demonstrated no change throughout the study, but the yoga group showed a significant improvement in scores from pre- to post-intervention for self-care (P<0.001), mindfulness (P=0.028), emotional exhaustion (P=0.008), and depersonalization (P=0.007) outcomes	NA	NA	Not reported

Contd...

Table 2: Contd...

Author/year	Population	Sample (1038)	Gender	Age range/ mean (years)	Type of yoga	Yoga protocol	Number of participants in control group/ interverntion	Cognitive and psychological	Findings	Attendance	Drop out	Adverse effect
Sis Çelik and Kılınç, 2022	Nurses	120	Male - 19 Female – 82	28.86	Laughter Yoga	Total 8 sessions for 4 weeks, twice a week, per session 1-h practice	Experimental. group - 60 Control group - 60	PSS MBI Life Satisfaction Scale	The experimental group was found to be statistically significant (P<0.05), whereas the difference between the pre-and post-test score averages of the nurses in the control group was not significant (P>0.05) in all the parameters	NA	19	Not reported
Dönmez *et al*., 2023b	2nd year undergraduate nursing students	88	Male – 12 Female - 76	20.79	Laughter Yoga	Immediate study, four sessions lasting approximately 40 min. Each of the four sessions lasted for 10 min	Intervention group - 44 Control group - 44	State-Trait Anxiety Inventory PSSNS Students' Vital Signs Evaluation Form SSSCLS	Laughter yoga helped nursing students reduce their state anxiety and perceived stress levels related to simulation training and improved their self-confidence and satisfaction with learning	100%	0	Not reported
Mandal *et al*., 2021b	Nursing staff	110	Male - 30 Female - 80	33.75	General Yoga Module	Two sessions in a week each with a duration of 50 min for 12 consecutive weeks were conducted	Intervention group – 19 Waitlisted control group – 32	Perceived Stress Scale Score ProQOL Cortisol HS-CRP	The finding showed that supervised structured yoga may be efficacious in reducing stress	Minimum 20 sessions in the 12-week period was considered a completed intervention	59	No participant reported any injury or morbidities requiring medical attention due to the yoga sessions
Ozturk and Tezel, 2021b	1st year nursing students	75	Male – 15 Female - 57	Not reported	Laughter yoga	Eight sessions of laughter yoga, that is, two sessions per week for 4 weeks Each laughter yoga session lasted about 40–45 min	Intervention group - 36 Control group - 36	Brief symptom inventory Cortisol level	Laughter yoga can provide an effective means to help 1st-year nursing students cope with stress and reduce mental symptoms	Not reported	3	Not reported

Contd...

Table 2: Contd...

Author/year	Population	Sample (1038)	Gender	Age range/ mean (years)	Type of yoga	Yoga protocol	Number of participants in control group/ interverntion	Cognitive and psychological	Findings	Attendance	Drop out	Adverse effect
Fang and Li, 2015b	Staff nurse	120	Females only (n=105)	35.59	General Yoga (physical postures, loosening exercises, breathing exercises, and meditation)	Two times every week for 50–60 min each time after work hours till 6 months	Yoga group=54 Nonyoga group=51	C-PSQI QMWS	Our findings indicate that 58.1% of the 105 nurses analysed had sleep disorders A regular yoga intervention can improve sleep quality and reduce work stress in staff nurses employed by a general hospital Nursing experience, age and yoga interventions are independent factors that contribute to subjective sleep disturbances	Not reported	15	Not reported
Ozturk and Tekkas-Kerman, 2022b	First Year Nursing Students	70	Girls only (n=61)	19.59	Online laughter therapy	twice weekly for four weeks, each laughter therapy session lasted about 40–45 min	Intervention group=32 Control group=29	DASS-42 The De Jong Gierveld Loneliness Scale	Online laughter therapy sessions significantly reduced depression but did not affect anxiety, stress, and loneliness	Not reported	9	Not reported
Rostami and Ghodsbin, 2019b	Nurses working in ICU	70	Females only (n=70)	29.9	General Yoga (In each session of yoga classes, three aspects of mind control, breathe control, and slow body movements were worked out.)	Three weekly sessions of yoga exercises for 6 months, per session -------	Intervention group=35 Control group=35	Quality of Life brief questionnaire (WHOQoL-Bref)	The intervention of yoga exercises was effective in improving the quality of life of nurses working in the ICU	Not reported	0	Not reported

Contd...

Table 2: Contd...

Author/year	Population	Sample (1038)	Gender	Age range/ mean (years)	Type of yoga	Yoga protocol	Number of participants in control group/ interverntion	Cognitive and psychological	Findings	Attendance	Drop out	Adverse effect
Mathad *et al*., 2017b	Nursing students	100	Females only (n=80)	19.5	Integrated approach to yoga therapy	8 weeks daily, each session was 60–70 min	Yoga group - 40 Waitlist control group - 40	FMI SCS-SF CD-RISC SWLS JSE-HPS PSS	88-week yoga interventions was significantly effective in improving self-compassion and mindfulness among nursing students in the experimental group and were then compared to the waitlist control group. Even though there were improvements in resilience, satisfaction in life, and perceived stress, results were not statistically significant	Not reported	20	Not reported
Dol Kim.S 2014 (Kim, 2014)	Nursing students	27	Females only (n=24)	21	Physical exercise (Surya Namaskara) combined with relaxation and meditation (Shavasana and Yoga Nidra)	60 min 1 day a week for 12 weeks	Yoga group - 12 Control group - 15	Life Stress Scale for college students, postprandial blood glucose levels	Yogic exercises would reduce life stress and lower postprandial blood glucose levels in nursing students	Not reported	3	Not reported
W.J *et al*., 2021b	Nursing professionals	30	Females only (n=30)	28.5	Mahamantra	20 min each day for 45 days	Intervention gorup - 15 Control group - 15	Serum stress markers Metabolic parameters PSS	Mahamantra chanting is a simple, economical, and effective intervention technique to be followed on a routine basis to alleviate stress and burnout among nursing healthcare professionals	Not reported	0	Not reported
Miyoshi, 2019b	Night shift nurses	20	Females only (n=20)	28.7	Restorative yoga	1-h guided group yoga session, minimum 3 times a week followed by 4 weeks of at-home practice for 5–15 min	Yoga group - 10 Control group - 10	Brief Job Stress Questionnaire	Restorative yoga may be effective for alleviating occupational stress among female nurses working the night shift	100%	0	No

Contd...

Table 2: Contd..

Author/year	Population	Sample (1038)	Gender	Age range/ mean (years)	Type of yoga	Yoga protocol	Number of participants in control group/ interverntion	Cognitive and psychological	Findings	Attendance	Drop out	Adverse effect
Patil 2018	Nurses in hospital	88	Females only (n=88)	32.75	Integrated Yoga and physical exercises	1 h/day and 5 days a week for 6 weeks	Integrated yoga group – 44 Physical exercise group - 44	WHOQOLBREF	Integrated yoga was showed improvements in physical, psychological, and social health domains of QOL better than physical exercises among nursing professionals with CLBP	Not reported	0	No any serious adverse effect

MB: Mindfulness-based, WHOQOL-BREF: World Health Organization quality of lifebref, HCPs: Healthcare professionals, HPLP: Health Promoting Lifestyle Profile II, FMI: Freiburg Mindfulness Inventory, MBI: Maslach Burnout Inventory, PSSNS: Perceived Stress Scale for Nursing Students, SSSCLS: Student Satisfaction and Self-Confidence in Learning Scale, ProQOL: Professional quality of life, HS-CRP: High-sensitivity C-reactive protein, C-PSQI: Pittsburgh Sleep Quality Index in Chinese, QMWS: Questionnaire on medical Worker's Stress, FMI: Freiburg Mindfulness Inventory, SCS-SF: Self-Compassion Scale-short form, CD-RISC: Connor–Davidson Resilience Scale, SWLS: Satisfaction with Life Scale, JSE-HPS: Jefferson Scale of Empathy HPS-Version, PSS: Perceived Stress Scale, ICU: Intensive care unit, NA: Not available, DASS: Depression Anxiety Stress Scale, CLBP: Chronic low back pain

involved in delivering the intervention. However, eight studies[34-36,40-42,44,47] did not provide any information on the qualifications of the yoga instructors. Dosage details for the yoga interventions were not adequately reported in five studies,[34-36,40-42,44,47] while 12 studies[36-47] provided sufficient implementation details. Only one study[35] adhered to the TIDieR checklist recommendations, and none followed the CLARIFY checklist. In addition, seven studies[34-36,43,44,46,47] did not specify the qualifications of the authors, although all studies did report the corresponding author's qualifications and institute names. However, four studies[38,43,44,47] did not mention the designation of the corresponding author.

Ethical approval was obtained for all studies, although five studies[40,41,43-45] did not provide an ethical registration number and nine studies[37,40-47] did not have a clinical registration number listed. The dropout rates across all studies ranged from 0% to 52.1%. Four studies[36,44,45,47] reported no dropouts, one study[38] had a dropout rate >20%, while the remaining studies had dropout rates of <16% (0%–15.8%). No adverse effects of the yoga interventions were reported in any of the studies.

This detailed overview highlights the diversity in intervention protocols, study designs, and outcomes, emphasizing the potential benefits and limitations of yoga interventions for mental health in NPS. Despite variations in implementation and reporting, these studies' findings underscore yoga's promising role in improving mental health and well-being among NSP participants.

Results of primary outcomes

Four studies[38,39,43,47] employed both invasive and noninvasive methods, while 10 studies[34-37,40-42,44-46] exclusively utilized noninvasive approaches. The primary outcomes assessed in this review included stress, anxiety, burnout, mindfulness, depression, quality of sleep, quality of life, life satisfaction/confidence, and other related mental health measures. These outcomes were selected to evaluate the impact of yoga interventions on the mental well-being of NPS, providing valuable insights into the effectiveness of yoga as a therapeutic tool for mental health improvement.

Stress

A total of 11 studies assessed stress using either invasive (glucose/cortisol/serum) or noninvasive measures. Of these, 9 studies[34-40,43,47] found a significant reduction in stress, while two studies[42,46] reported no significant difference. However, the experimental group consistently showed a greater reduction in stress levels compared to the control group.

Anxiety

Three studies[35,39,46] investigated anxiety using self-measurement, and all found a significant reduction in the experimental group compared to the control group.

All of these studies employed LY as an intervention and concluded that LY helps achieve physiological and psychological benefits in NPS.

Burnout

Three studies[34,37,45] examined burnout using self-measurement and all found a significant reduction in the experimental group compared to the control group. Burnout, characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment, is often linked to chronic workplace stress. Factors such as long hours, a competitive work environment, and lack of trust from employers contribute to stress and burnout in NPS.[49]

Mindfulness

Three studies[37,42,45] measured mindfulness through self-assessment and found a significant improvement in the experimental group compared to the control group. Mindfulness, defined as a focused awareness of the present moment, is linked to reduced stress and improved mental well-being.

Depression

Two studies[39,46] measured depression through self-assessment, and both reported a significant reduction in the experimental group compared to the control group.

Quality of sleep

Two studies[37,40] assessed sleep quality using self-reports and both showed significant improvement in the experimental group compared to the control group.

Quality of life

Three studies[41,44] used self-assessment to evaluate the quality of life, with one study[38] reporting improvement but not statistically significant. The lack of statistical significance in this study was attributed to the randomization process and high dropout rates (55%) related to intervention timing and personal reasons such as family health issues. Excluding this study, other studies showed significant improvements in the experimental group compared to the control group.[41,44]

Life satisfaction/confidence

Three studies[35,42,45] used self-assessment to evaluate life satisfaction and confidence, and all showed significant improvement in the experimental group compared to the control group.

Discussion

The findings of this systematic review highlight the promising role of yoga interventions in improving the mental health and well-being of NPS. The review identified 14 RCTs that evaluated the impact of yoga on various mental health outcomes, including stress, anxiety, burnout, depression, sleep quality, quality of life, and mindfulness. The results of these studies suggest that yoga is an effective intervention for managing mental health issues commonly experienced by NPS, especially stress, anxiety, burnout and depression. This is in line with recent systematic reviews that highlight yoga's effectiveness in preventing and treating mental health issues, outperforming other forms of exercise and nonexercise interventions. Yoga has been shown to reduce burnout,[38,46,50,51] stress,[38,50,52,53] anxiety,[54-58] and depression,[54,56-59] across various populations previously. Meta-analyses further confirm its role in alleviating depression in both healthy and clinical populations, emphasizing its broad applicability.[60,61] In addition, yoga has demonstrated benefits in improving sleep quality among healthcare workers and patients,[51,61] and enhancing life satisfaction in adults,[62] which is essential for overall psychological well-being. Below, we discuss the findings based on our key outcome variables.

Stress reduction

A significant reduction in stress levels was observed in 9 out of the 11 studies that measured stress, with the experimental groups consistently reporting greater improvements compared to the control groups. These findings are in line with existing literature, which suggests that yoga's mind–body approach, involving both physical postures and breathing exercises, can significantly modulate the body's stress response by lowering cortisol levels and promoting relaxation. The consistent reduction in stress levels underscores yoga's potential as a valuable tool for coping with the chronic stress that often affects NPS due to the high demands of their roles.

Anxiety and burnout

Yoga interventions, particularly LY, significantly reduced anxiety and burnout in NPS. Anxiety was reduced in all three studies that assessed it, and burnout was alleviated in all three studies that examined it. Burnout, characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment, is a well-documented concern in healthcare professions, especially among nurses. The mental and physical relief provided by yoga, through deep breathing, mindfulness, and relaxation techniques, may be particularly beneficial in addressing the emotional exhaustion and stress-related symptoms of burnout. These findings suggest that yoga can be an effective preventive and therapeutic intervention for reducing burnout, which is linked to chronic workplace stress.

Mindfulness and depression

Yoga's positive impact on mindfulness and depression was evident, with three studies demonstrating significant improvements in mindfulness and two studies reporting reductions in depression. Mindfulness, which involves cultivating awareness of the present moment, has been associated with reductions in stress and improvements in mental well-being. The practice of yoga fosters mindfulness

through breath control (pranayama) and meditative focus, contributing to a heightened sense of self-awareness and emotional regulation. The reduction in depressive symptoms observed in this review aligns with other studies that have suggested yoga's potential as a complementary treatment for depression, particularly for individuals in high-stress environments such as healthcare settings.

Sleep quality and quality of life

Yoga significantly improved sleep quality in two studies, which is particularly important for NPS, who often face irregular working hours, including night shifts. Poor sleep quality has been linked to various mental and physical health issues, including burnout and depression. By promoting relaxation and reducing stress, yoga interventions help regulate the nervous system, contributing to better sleep patterns. Similarly, while quality of life improvements were statistically significant in two studies, one study did not find a significant effect. This may be attributed to high dropout rates and variations in the timing and frequency of interventions. Nevertheless, the overall trend suggests that yoga positively impacts the subjective well-being of NPS, enhancing their overall life satisfaction and confidence.

Yoga protocols and intervention design

The diversity of yoga protocols in the included studies is worth noting. While LY was the most commonly employed method, other forms of yoga, such as mindfulness-based yoga, integrated yoga, and general yoga protocols, were also used. While specific type of yoga may influence the outcomes, the core components of yoga – breathing exercises, physical postures, and meditation – are essential in promoting mental well-being. The variety in intervention duration (from 4 weeks to 24 weeks) and frequency (once a week to several times a week) further highlights the flexibility of yoga as an intervention, which can be tailored to fit the schedules of busy healthcare professionals and students.

Mechanisms of action of yoga

Yoga has been shown to impact the hypothalamic–pituitary–adrenal axis by reducing cortisol levels, which are typically elevated during stress. In addition, yoga's stretching exercises enhance parasympathetic nerve activity, helping regulate stress hormones. Systematic reviews highlight that yoga can positively influence physiological and psychological parameters, leading to stress reduction in adults.[63,64] The release of endorphins induced by yoga can help reduce depressed mood[65] and increase mood-elevating anti-stress factors, which also alleviate anxiety and enhance pain tolerance.[66-68] Meta-analyses have demonstrated that yoga practices, including LY, are effective complementary methods for reducing anxiety levels across various conditions.[61,69-71] Yoga practices also help calm the mind with a positive approach, improve emotional resilience, and reduce burnout levels in healthcare workers, including nurses.[30,51] In addition, yoga enhances blood flow and hemoglobin, increasing oxygen delivery to body cells and improving overall function.[72] Meditation practices stimulate dopamine secretion and influence conscious states at the synaptic level.[73] Research has also shown that yoga reduces depression by acting at the hypothalamic level, lowering cortisol, and promoting an "anti-stress" effect.[74] Moreover, yoga practices reduce nerve tension, balance the sympathetic nervous system, alleviate fatigue, support deep sleep, and stimulate endorphin secretion, all of which contribute to better sleep quality.[75] Furthermore, yoga strengthens muscles, improves flexibility, enhances respiratory and cardiovascular functions, aids in addiction recovery, and promotes overall well-being and quality of life.[72] Reviews have also reported improvements in the quality of life for both healthy and unhealthy populations through regular yoga practice.[76-79] Regular yoga practice increases the synthesis of positive chemicals such as dopamine, serotonin, oxytocin, and endorphins, which contribute to feelings of happiness, warmth, and relaxation.[73,80,81] Yoga also fosters a positive attitude toward both good and challenging experiences.[82]

Limitations and future directions

While the findings of this review are promising, several limitations must be considered. First, the quality of the studies varied, with some studies lacking adequate reporting on instructor qualifications, intervention details, and adherence to standardized reporting guidelines such as the TIDieR checklist. These issues may affect the reproducibility of the interventions and their generalizability. In addition, the dropout rates varied significantly across studies, and while no adverse effects were reported, the impact of dropout bias on the overall results should not be overlooked. Another limitation is the lack of long-term follow-up in most studies. The short-term effects of yoga on mental health outcomes are well-documented, but it is unclear whether these benefits are sustained over time. Future research should include longer follow-up periods to assess the long-term efficacy of yoga interventions and whether they can lead to lasting improvements in mental health for NPS. Finally, while this review focused exclusively on RCTs, which provide the highest level of evidence, further research should explore the mechanisms underlying yoga's effectiveness. Studies investigating how yoga affects physiological markers such as cortisol, heart rate variability, and brain activity could provide a deeper understanding of how yoga helps regulate the stress response and improve mental well-being.

Conclusion

This systematic review provides evidence that yoga interventions are effective in reducing stress, anxiety, burnout, depression, and other mental health issues among

NPS. Yoga's holistic approach, which integrates physical, mental, and spiritual well-being, makes it a valuable tool for managing the unique challenges faced by NPS. As the mental health burden among healthcare professionals continues to rise, yoga offers a promising, accessible, and cost-effective solution to support their mental health and well-being. Future studies should focus on refining intervention protocols, addressing methodological limitations, and exploring long-term outcomes to further establish yoga as an essential component of mental health care for NPS.

Credit authorship contribution statement

Rahul Geeta Arya: Writing-review and editing, Writing – original draft, Methodology, Investigation, Formal Analysis, Conceptualization. Deepshika Srivastava: Editing, Results, Discussion, Conclusion. Divya BR: Methodology, Investigation, Formal Analysis. Madhu: Screening, Inclusion and Exclusion, Intervention, Tables and Graph. Hemant Bhargav: Writing – review and editing, Methodology, Investigation, Supervision, Abstract, Formal analysis, conceptualization.

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Conflicts of interest

There are no conflicts of interest.

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