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Mindfulness, Self-Compassion, and Perceived Stress in Breast Cancer Survivors: A Systematic Review of Quantitative Evidence

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ABSTRACT

Background: Mindfulness and self-compassion are increasingly recognized as psychological resources that may alleviate perceived stress among breast cancer survivors. However, their interrelationships have not previously been comprehensively synthesized. This systematic review evaluated quantitative evidence on the relationships among mindfulness, self-compassion, and perceived stress in women with breast cancer.

Methods: This review was registered with PROSPERO. MEDLINE, ProQuest, Scopus, Web of Science, and Google Scholar were searched for English-language quantitative studies published between 2009 and 2025. Eligible studies included adult women with breast cancer and examined at least two of the following variables: mindfulness, self-compassion, and perceived stress. Two reviewers independently screened studies, extracted data, and assessed methodological quality using Joanna Briggs Institute appraisal tools. Owing to substantial methodological heterogeneity, findings were synthesized narratively.

Results: Twenty-four studies involving 2842 participants from 13 countries were included, comprising 18 intervention and 6 observational studies. Most intervention studies evaluated mindfulness-based approaches and generally reported reductions in perceived stress, although long-term effects were inconsistent. Observational studies consistently demonstrated inverse associations between mindfulness or self-compassion and perceived stress, with one notable exception. Only two studies simultaneously examined all three constructs, highlighting an important gap in the literature. Most included studies were rated as high methodological quality.

Conclusion: Current evidence suggests that mindfulness and self-compassion are associated with lower perceived stress among breast cancer survivors and supports the integration of these approaches into supportive cancer care. Future research should evaluate all three constructs within unified theoretical frameworks, examine long-term intervention effectiveness, and expand evidence from underrepresented populations.

INTRODUCTION

Breast cancer represents a significant worldwide health challenge. It remains the most frequently diagnosed cancer in women and ranks as the second leading contributor to cancer-related deaths globally. The World Health Organization reports that in 2022, around 2.3 million women received a breast cancer

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diagnosis, with nearly 670 000 fatalities recorded across 152 nations.[1] Women with breast cancer undergo various individual or combined cancer treatment plans depending on their stage of cancer and tumor size. Cancer treatment is associated with numerous adverse psychological outcomes, including anxiety, depression, and elevated perceived stress.[2,3]

Perceived stress is a common psychological side effect that impacts women with breast cancer.[3] It is defined as an individual's subjective perception of stress, regardless of the extent to which the situation is stressful. It leads to the deterioration of women's health—resulting in impaired oral intake, decreased adherence to medical instructions, delayed wound healing, and prolonged hospital stays—and threatens the financial integrity of the health care system.[4,5] It is therefore essential to understand factors affecting perceived stress in women with breast cancer.

Both mindfulness practices and structured mindfulness-based programs have demonstrated significant and clinically meaningful benefits for various psychological outcomes in women with breast cancer. These include decreased perceived stress, improved emotional regulation, and strengthened coping capacities when facing the emotional and physical demands of cancer diagnosis and treatment.[3,6–8] According to a recent systematic review and meta-analysis, mindfulness interventions effectively enhanced the quality of life of breast cancer survivors.[9] Research consistently demonstrates a negative relationship between self-compassion and perceived stress, whereby individuals with greater self-compassion tend to report lower stress levels. This inverse association was corroborated by a recent systematic review encompassing 113 studies that explored the link between self-compassion and various psychological outcomes.[10] Moreover, self-compassion is increasingly recognized as a key mechanism through which mindfulness-based practices exert their beneficial effects on various aspects of mental health, including anxiety, depression, and emotional adjustment to illness.[11]

Numerous systematic reviews and meta-analyses have investigated mindfulness-based interventions specifically designed for patients with breast cancer, as well as self-compassion-focused programs in broader populations.[12,13] However, no previous review has specifically examined the combined influence of mindfulness, self-compassion, and perceived stress within the population of women with breast cancer. Filling this knowledge void is crucial for designing psychosocial interventions in oncology that deliberately incorporate mindful self-compassion to alleviate stress in women with breast cancer.

Therefore, this systematic review aims to systematically identify, appraise, and synthesize quantitative evidence on the relationships among mindfulness, self-compassion, and perceived stress among women diagnosed with breast cancer. A key research question in this study is: What are the direction and strength of the relationships among mindfulness, self-compassion, and perceived stress in women with breast cancer, and how do these relationships vary across different study designs and interventions?

METHODS

Methodological integrity was maintained by employing Whittemore and Knafl's 5-step approach, which entails (1) clearly defining the research problem; (2) conducting a thorough literature search; (3) appraising the evidence for quality and relevance; (4) synthesizing data to reveal key patterns and reach conclusions; and (5) presenting the synthesized findings alongside actionable recommendations for future work.[14] Moreover, this systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines as outlined by Page *et al.*[15]

Eligibility criteria

Inclusion criteria

This systematic review included studies that were conducted in any country and published in English between 2009 and 2025, because the literature base began to expand in the early 2000s and has grown substantially over the past decade. All studies incorporated in this review employed quantitative methodologies, including randomized clinical trials (RCTs), cohort, case-control, cross-sectional, and longitudinal designs, and recruited adult female participants (aged ≥ 18 years) with a diagnosis of breast cancer, irrespective of cancer stage, nationality, or treatment regimen.

Studies were required to concurrently examine at least 2 of the following variables: mindfulness, self-compassion, or perceived stress, with no restriction on the measurement tools. Studies that reported mindfulness-based or self-compassion-based interventions with perceived stress as an outcome were also eligible. Finally, studies that reported the significance and effect sizes for the relationships among the study variables (eg, correlations, regression coefficients) were included.

Exclusion criteria

Studies were excluded if they did not exclusively enroll women with breast cancer as primary participants; involved breast cancer in men or pediatric populations; used qualitative-only designs; or were reviews, commentaries, editorials,

conference abstracts, research protocols, dissertations, scale development studies, quality appraisals, or psychometric investigations.

Search strategy

The search for this systematic review was conducted in May 2026 across 4 databases: Scopus, Medline, ProQuest, and Web of Science. To ensure a comprehensive examination of the psychological literature, the PsycINFO database was systematically searched via the ProQuest platform as part of the core database strategy. An additional manual search was conducted in Google Scholar, and key articles were screened to identify any eligible studies. To ensure rigor and relevance, Boolean operators were used, with search terms adapted for each database (Supplementary File): ("breast cancer" OR "breast neoplasms" OR "breast carcinoma") AND (mindfulness OR "mindfulness-based" OR "mindfulness-based stress reduction" OR MBSR OR MBCT OR "self compassion" OR "self-compassion" OR "mindful self-compassion" OR "compassion-focused" OR "perceived stress" OR stress). Minor differences in syntax were necessary to accommodate the indexing and search functionalities of individual databases. All retrieved studies were imported into Rayyan, where duplicates were removed and title/abstract screening was performed. Data extraction was subsequently documented in a Microsoft Word file.

Study selection

All identified records were uploaded to Rayyan for duplicate removal. Two authors independently screened titles and abstracts against the predefined eligibility criteria. Full texts of articles that appeared potentially relevant were retrieved and independently assessed by both reviewers. Any discrepancies were resolved through consensus discussion. The study selection process was presented in a PRISMA flow diagram.[15,16]

Data extraction

The first and third authors extracted the data, and any discrepancies were resolved in a meeting. The standardized form captured study identification (authors' names, year of publication, and country), design and aim, sample size, key study variables and their measurement scales, and key findings.

Risk of bias and quality appraisal

Methodological quality of all included studies was assessed using the Joanna Briggs Institute (JBI) critical appraisal tools appropriate to each study design. The JBI checklists comprised different item numbers depending on study design: 13 items for RCTs, 9 items for quasi-experimental and pretest/posttest studies, and 8 items for cross-sectional studies.[17] Each checklist comprises items evaluating key sources of bias, including clarity of inclusion criteria, reliability of exposure and outcome measurement, identification and control of confounders, appropriateness of statistical analysis, and completeness of follow-up. Two reviewers independently completed the JBI checklists for each study, rating each item as 1 for "Yes," 0 for "No," 0 for "Unclear," or as "Not applicable" (NA) if the item was excluded from scoring. Studies rated > 75.1% were considered excellent, those rated 50.1% to 75.0% had some limitations, and studies rated ≤ 50.0% were classified as having several limitations. Disagreements were resolved by discussion; overall appraisal (eg, include, exclude, or seek further information) was documented and used to inform sensitivity analyses and interpretation of findings.

Data analysis

Two independent reviewers conducted a narrative synthesis. This approach was employed to delineate similarities and differences between the included studies, with the findings organized under the following subheadings: study characteristics, research designs, study variables, measurement scales, observational studies, and experimental studies. For the observational studies, the relationships between the study variables were addressed, including the effect sizes. The interventions were described in terms of their characteristics. Given the substantial methodological heterogeneity, a meta-analysis was not conducted. The analysis was cross-validated by a third reviewer, who verified the findings and resolved any discrepancies.

RESULTS

Study selection

The initial database search conducted in May 2026 yielded 5612 articles: ProQuest (n = 3276), Medline (n = 1271), Web of Science (n = 1000), and Scopus (n = 65). After duplicates were removed, 4880 articles remained for title and abstract screening. A total of 1537 articles were deemed eligible for full-text assessment. Of these, 1012 were unrelated to the topic, 231 examined variables outside the scope of the current review, 130 involved a different population, 102 used inappropriate study designs, and 44 were excluded because of an ineligible publication type. Consequently, 18 studies identified through database searching were included for data extraction. A follow-up search in the same month using Google Scholar yielded 7 additional studies. Of these, 1 was excluded because it examined only one of the

required variables, leaving 6 eligible studies from Google Scholar. In total, 24 studies met the inclusion criteria and were included in the data extraction (Figure 1).

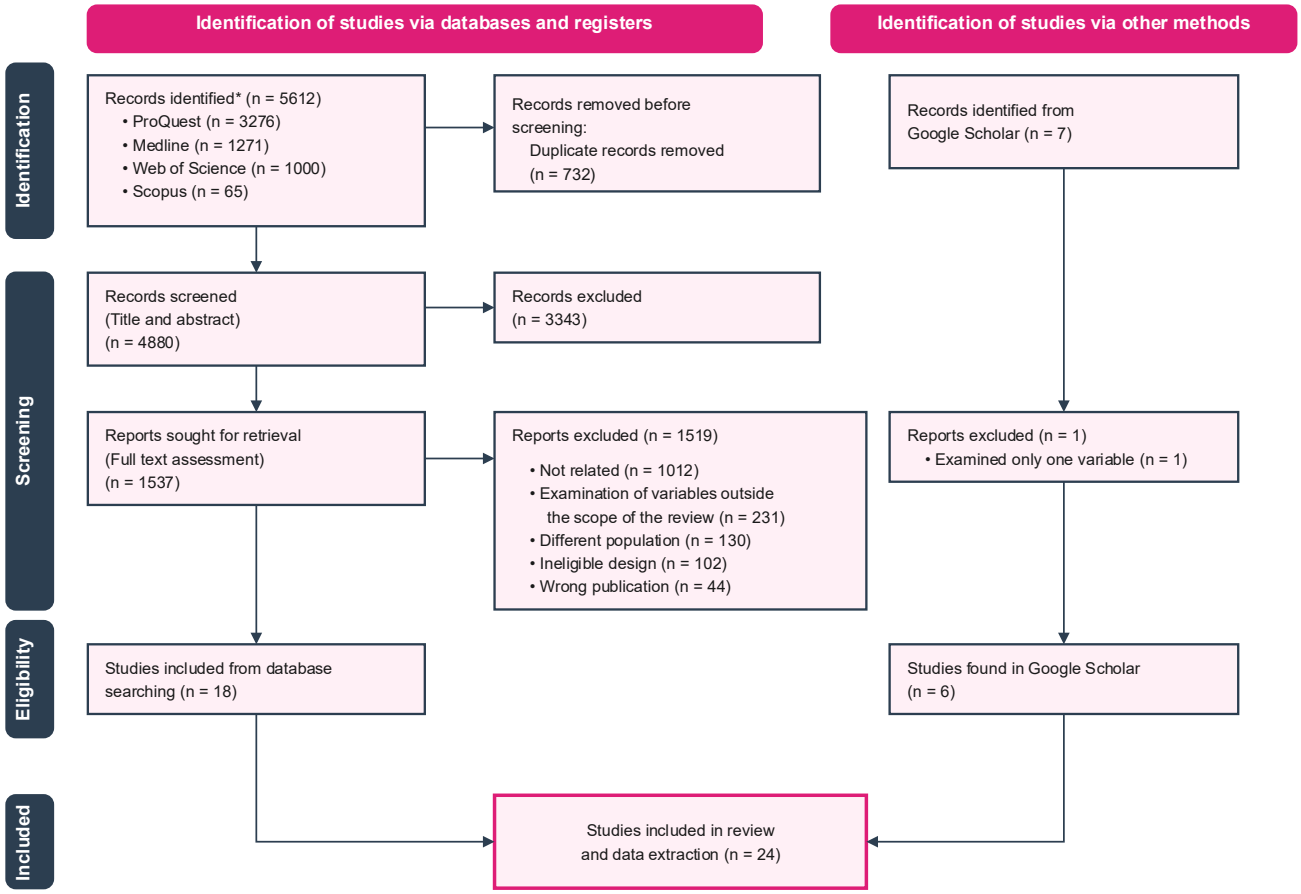


Figure 1. PRISMA Flow Diagram of the Study Selection. This figure shows the number of records identified, screened, excluded with reasons, and included in the final review.

The Results section provides a detailed overview of the included studies, describing their key characteristics, research designs, key variables investigated, measurement instruments, and the key outcomes and findings reported in the observational and experimental studies (Table 1).

Study characteristics

Countries of origin

The 24 eligible studies were published in international journals between 2009 and 2025 and involved a total of 2842 breast cancer survivors aged 18 to 70 years from 13 countries. Seven studies were conducted in the US,[18–24] 5 in Europe,[8,25–28] 3 in Iran,[29–31] 3 in China,[32–34] 1 in Saudi Arabia,[3] 1 in Korea,[35] 1 in Thailand,[36] 1 in India,[7] 1 in Turkey,[37] and 1 in Taiwan[38] (Figure 2).

Quality appraisal

Table 2 (for randomized and non-randomized clinical trials) and Table 3 (for cross-sectional studies) represent the quality appraisal of the included studies utilizing the JBI appraisal tools. Overall, 15 studies achieved excellent quality (> 75.1%) on the JBI quality appraisal tools, of which 14 were clinical trials[7,8,19–22,24–28,33,35,38] and 1 was a cross-sectional study.[3] Eight studies had some limitations (50.1% to 75.0%), of which 3 were clinical trials[18,23,37], and 5 were cross-sectional studies.[29–31,34,36] Only 1 study had a quality score of ≤ 50.0%, which used an intervention approach.[32] This indicates that most of the excellent-quality studies were clinical trials that involved interventions, and most of the medium-quality studies were cross-sectional.

Table 1. Characteristics of the Included Studies (n = 24)

Study identification	Design and aim	Participants	Key study variables and measurement scales	Key findings
Boyle *et al.*[18] 2017 (US)	RCT to test emotion regulation strategies as mediators of intervention effects in younger women treated for breast cancer	n = 71; Intervention, n = 39; Control, n = 32	Mindfulness: Five-Facet Mindfulness Questionnaire (FFMQ); Perceived stress: 10-item Perceived Stress Scale (PSS-10); Self-kindness (subscale of self-compassion)	Self-kindness mediated the relationship between mindfulness and perceived stress, *b* (SE) = −2.53 (1.20). Both mediated the intervention, resulting in sustained stress reduction at 3 months, *b* (SE) = −3.56 (1.64).
Gonzalez *et al.*[26] 2018 (Spain)	RCT to study efficacy of cognitively-based compassion training (CBCT) protocol on self-compassion and mindfulness	n = 56; Intervention, n = 28; Control, n = 28	Self-compassion: Self-Compassion Scale–Short Form (SCS-SF); Mindfulness: FFMQ–Short Form	Mindfulness: higher in intervention group ($P < 0.05$; $d = 0.37$; 95% CI, −0.19 to 0.92). Self-compassion: intervention scored higher at 6-month follow-up ($P < 0.05$; $d = 0.94$; 95% CI, 0.34 to 1.55).
Lengacher *et al.*[21] 2021 (US)	RCT to test if positive effects from MBSR(BC) were mediated by changes in mindfulness, fear of recurrence, and stress	n = 322; Intervention, n = 167; Control, n = 155	Perceived stress: PSS-14; Mindfulness: FFMQ and Cognitive and Affective Mindfulness Scale-Revised (CAMS-R)	Stress: Lower stress with MBSR at 6 weeks ($P = 0.10$) and 12 weeks ($P = 0.11$). Mindfulness: Improvement on FFMQ at 12 weeks ($P = 0.08$); no change on CAMS-R.
Dodds *et al.*[20] 2015 (US)	RCT to assess feasibility and possible behavioral effects of CBCT	n = 33; Intervention, n = 16; Control, n = 17	Perceived stress: PSS-4; Mindfulness: CAMS-R	Stress: Week 12 intervention group had lower stress (−1.6; 95% CI, −3.1 to −0.2). Mindfulness: Higher in intervention at Week 12 (3.1; 95% CI, 0.4 to 5.8).
Cheung *et al.*[19] 2017 (US)	RCT (pilot) to examine feasibility of a 5-week positive affect skills intervention (in-person vs online)	n = 39; Intervention 1, n = 14; Intervention 2, n = 12; Control, n = 13	Mindfulness: recently developed scale; Self-compassion: SCS-SF	Interventions produced significant within-group increases in self-compassion and mindfulness at posttest and 1-month follow-up ($P < 0.08$; $d = 0.50$–0.91).
Lengacher *et al.*[22] 2009 (US)	RCT to determine if MBSR is effective in improving psychological and physical status	n = 84	Mindfulness: intervention; Perceived stress: PSS-10	No significant difference in perceived stress between groups ($P = 0.29$).
Zhang *et al.*[32] 2017 (China)	RCT to investigate efficacy of MBSR on decreasing perceived stress	n = 58	Mindfulness: intervention; Perceived stress: PSS (Chinese version)	Significant decrease in perceived stress across multiple data collection points ($F = 14.41$, $P < 0.001$).
Bower *et al.*[24] 2015 (US)	RCT to evaluate a mindfulness-based intervention for younger women (aged ≤ 50 years)	n = 71; Intervention, n = 39; Control, n = 32	Mindfulness: intervention; Perceived stress: PSS	Short-term efficacy noted ($P = 0.004$). Long-term effects (after 3 months) were not sustained.
Pehlivan & Eyi[37] 2025 (Turkey)	RCT to investigate efficacy of mindfulness-based meditation and yoga	n = 39; Intervention, n = 19; Control, n = 20	Mindfulness: intervention; Perceived stress: PSS	Significant reductions in perceived stress ($P < 0.05$).
Hsiao *et al.*[38] 2025 (Taiwan)	RCT to test a mindfulness compassion-based intervention on depression and quality of life via mediators	n = 77; Group 1, n = 39; Group 2, n = 38	Mindfulness: FFMQ; Self-compassion: SCS-13	Changes in mindfulness significantly predicted changes in self-compassion ($B = 10.39$, SE = 2.66, $P < 0.001$). Variables did not mediate intervention effect.
Svendsen *et al.*[27] 2025 (Norway)	RCT to examine 2 digital stress management programs	n = 430; Intervention 1, n = 140; Intervention 2 (MBSR), n =	Mindfulness: FFMQ; Perceived stress: PSS-10	No significant mean differences in stress (MD, −0.28 [95% CI, −1.75 to 1.19]) or mindfulness (MD, 0.49 [95% CI, −0.05 to 1.03]) at 6 months.

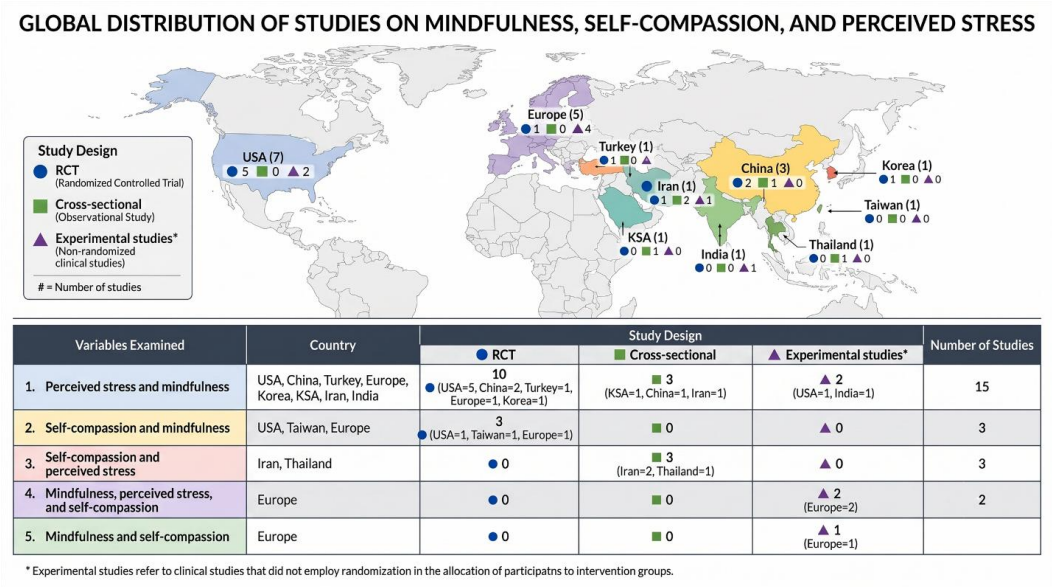
		143; Control, n = 147		
Zhang *et al.*[33] 2022 (China)	RCT to investigate nurse-led Mindfulness-based Tai Chi Chuan (MTCC) program	n = 59; Intervention, n = 30; Control, n = 29	Mindfulness: intervention; Perceived stress: PSS-10	Perceived stress significantly decreased at later data collection points ($F = 55.22$, $P < 0.001$).
Ryu *et al.*[35] 2024 (Korea)	Prospective non-randomized controlled trial using Headspace on Netflix	n = 84; Intervention, n = 40; Control, n = 44	Mindfulness: CAMS-R; Perceived stress: PSS	Mindfulness: no difference between groups ($P = 0.80$). Stress: significant reduction in intervention group ($P = 0.001$) vs control ($P = 0.17$).
Sakki *et al.*[8] 2022 (Finland)	Single-group pilot experimental study to assess mental well-being in MBSR participants	n = 23	Mindfulness: FFMQ; Self-compassion: SCS; Perceived stress: PSS	Marginally significant reduction in stress ($d = -0.40$, $P = 0.09$). No changes in self-compassion or mindfulness.
Hoffman & Baker[25] 2023 (Europe)	Pretest/posttest experimental design on effects of a standard MSC program	n = 35	Self-compassion: SCS-SF; Mindfulness: CAMS-R	Significant increases in self-compassion and mindfulness ($P < 0.001$).
Lengacher *et al.*[23] 2018 (US)	Single-group pilot pretest/posttest study to test feasibility and symptom improvement	n = 15	Mindfulness: FFMQ; Perceived stress: PSS	Significant improvement in perceived stress at 6 weeks ($P = 0.004$, $d = 0.8$).
Trindade *et al.*[28] 2020 (Portugal)	2-arm pilot experimental design to test acceptability and efficacy in breast cancer	n = 32; Intervention, n = 15; Control, n = 17	Mindfulness: FFMQ; Self-compassion: SCS; Perceived stress: PSS	Significant reduction in stress ($g = -0.32$), increase in mindfulness ($g = 0.41$), and increase in self-compassion ($g = 0.38$) in experimental group.
Naskar *et al.*[7] 2024 (India)	Experimental study to assess MBI effect on stress during chemotherapy	n = 40; Intervention, n = 20; Control, n = 20	Mindfulness: intervention; Perceived stress: PSS-10	MBI significantly reduced perceived stress ($t = 2.24$, $P = 0.03$).
Abdollahi *et al.*[29] 2020 (Iran)	Cross-sectional study exploring self-compassion, perceived stress, and self-care behaviors	n = 210	Self-compassion: SCS-24; Perceived stress: PSS-10	Negative association between perceived stress and self-compassion ($r = -0.62$, $P < 0.01$).
Krutchan *et al.*[36] 2024 (Thailand)	Cross-sectional study	n = 210	Self-compassion: SCS-26; Perceived stress: PSS-10	Stress was not a significant predictor of self-compassion. Moderate positive correlation noted ($r = 0.44$).
Al-Ghareeb *et al.*[3] 2025 (Saudi Arabia)	Cross-sectional study to investigate mindfulness, perceived stress, and sociodemographics	n = 152	Mindfulness: CAMS-R; Perceived stress: PSS-10	Significant negative strong correlation between mindfulness and perceived stress ($r = -0.53$, $P < 0.001$).
Bordbar & Shoaei[30] 2025 (Iran)	Descriptive-analytical correlational cross-sectional study	n = 150	Self-compassion: SCS-SF; Perceived stress: PSS	Significant negative correlation between self-compassion and stress ($r = -0.44$, $P < 0.001$). Self-compassion significantly predicted stress ($\beta = -0.31$, $P < 0.001$).
Zhou *et al.*[34] 2025 (China)	Cross-sectional study employing mediation analysis	n = 312	Mindfulness: CAMS-R; Perceived stress: PSS	Significant moderate negative relationship between mindfulness and perceived stress ($r = -0.39$, $P = 0.01$).
Arefian *et al.*[31] 2023 (Iran)	Descriptive cross-sectional study employing structural mediation analysis	n = 240	Mindfulness: unstated tool; Perceived stress: PSS-10	Mindfulness significantly predicted perceived stress ($\beta = -0.43$, $P < 0.01$).

Cross-sectional studies

This systematic review included 6 cross-sectional studies. Half of these studies (n = 3) were conducted in Iran,[29–31] and the remaining were conducted in Saudi Arabia, Thailand, and China.[3,34,36]

Study variables

For each variable, Table 4 presents the frequencies of perceived stress, self-compassion, and mindfulness assessments across the included studies.



Variables Examined	Country	Study Design			Number of Studies
		RCT	Cross-sectional	Experimental studies*	
1. Perceived stress and mindfulness	USA, China, Turkey, Europe, Korea, KSA, Iran, India	10 (USA=5, China=2, Turkey=1, Europe=1, Korea=1)	3 (KSA=1, China=1, Iran=1)	2 (USA=1, India=1)	15
2. Self-compassion and mindfulness	USA, Taiwan, Europe	3 (USA=1, Taiwan=1, Europe=1)	0	0	3
3. Self-compassion and perceived stress	Iran, Thailand	0	3 (Iran=2, Thailand=1)	0	3
4. Mindfulness, perceived stress, and self-compassion	Europe	0	0	2 (Europe=2)	2
5. Mindfulness and self-compassion	Europe	0	0	1 (Europe=1)	

* Experimental studies refer to clinical studies that did not employ randomization in the allocation of participatns to intervention groups.

Figure 2. Geographic Distribution of the Studies and the Examined Variables

Table 2. Quality Appraisal According to JBI Checklists for Cross-Sectional Studies

Study	1	2	3	4	5	6	7	8	Total score	Quality assessment
Abdollahi *et al.*[29] 2020	Yes	Yes	Yes	Yes	No	No	Yes	Yes	6/8	75.0%
Al-Ghareeb *et al.*[3] 2025	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8/8	100.0%
Bordbar & Shoaei[30] 2025	Yes	Yes	No	Yes	No	No	Yes	Yes	5/8	62.5%
Krutchan *et al.*[36] 2024	Yes	Yes	Yes	Yes	No	No	Yes	Yes	6/8	75.0%
Zhou *et al.*[34] 2025	Yes	Yes	Yes	Yes	No	No	Yes	Yes	6/8	75.0%
Arefian *et al.*[31] 2023	Yes	Yes	Yes	Yes	No	No	Yes	Yes	6/8	75.0%

[a] Scoring: 1 (Yes), 0 (No), (Unclear), NA (Not applicable). Evaluation: Excellent (> 75.1%), Some limitations (50.1% to 75.0%), Several limitations (≤ 50.0%). Criteria 1-8 refer to the standard JBI cross-sectional appraisal checklist questions.

Table 3. Quality Appraisal According to JBI Checklists for Analytical, Randomized Controlled, and Clinical Trials

Study	Total score	Quality assessment
Boyle *et al.*[18] 2017	7/13	53.8%
Cheung *et al.*[19] 2017	11/13	84.6%
Dodds *et al.*[20] 2015	10/13	76.9%
Gonzalez *et al.*[26] 2018	11/13	84.6%
Lengacher *et al.*[21] 2021	12/13	92.3%
Lengacher *et al.*[22] 2009	10/13	76.9%
Zhang *et al.*[32] 2017	6/13	46.2%
Bower *et al.*[24] 2015	10/13	76.9%
Pehlivan & Eyi[37] 2025	9/13	69.2%
Hsiao *et al.*[38] 2025	11/13	84.6%
Svendsen *et al.*[27] 2025	10/13	76.9%
Zhang *et al.*[33] 2022	10/13	76.9%
Sakki *et al.*[8] 2022	8/9	88.8%
Ryu *et al.*[35] 2024	8/9	88.8%
Lengacher *et al.*[23] 2018	5/9	55.5%
Trindade *et al.*[28] 2020	8/9	88.8%
Naskar *et al.*[7] 2024	8/9	88.8%
Hoffman & Baker[25] 2023	7/9	77.7%

[a]Evaluation: Excellent (> 75.1%), Some limitations (50.1% to 75.0%), Several limitations (≤ 50.0%). Detailed individual criterion scoring was performed per the standard 13-item JBI checklist for RCTs and 9-item checklist for quasi-experimental studies.

Figure 2 illustrates the relationships among mindfulness, self-compassion, and perceived stress and highlights the studies' designs and countries of origin.

Self-compassion

Self-compassion was assessed in 7 studies using either the long or short form of the Self-Compassion Scale (SCS); 4 of these utilized the short-form version (SCS-SF),[19,25,26,30] 3 studies used the 26-item Self-Compassion Scale,[8,28,36] 1 used the 24-item version,[29] and 1 employed the 13-item short form.[38]

Perceived stress

To measure perceived stress, the Perceived Stress Scale (PSS) was used in all studies we examined. The 10-item Perceived Stress Scale (PSS-10) was used in 17 studies;[3,7,8,18,22–24,27–31,34–37] the remaining 2 studies used the 14-item PSS[21] and the 4-item short version.[20]

Observational studies

Table 5 shows the 6 observational cross-sectional studies included in this systematic review. Three of these studies examined the relationship between self-compassion and perceived stress.[29,30,36]

Table 4. Frequency of Examining Perceived Stress, Mindfulness, and Self-Compassion

Variable	No. of studies	References
Perceived stress	n = 20	3, 7, 8, 18, 20–24, 27–37
Mindfulness	n = 20	3, 7, 8, 18–28, 31–35, 37, 38
Self-compassion	n = 9	8, 19, 25, 26, 28–30, 36, 38

Also, 3 studies assessed the relationship between mindfulness and perceived stress.[3,31,34] Of the 6 studies, 4 examined the relationship between the study variables using correlation and regression analyses and reported effect sizes.[3,30,31,36] However, only 2 studies addressed the relationship between the study variables solely through correlation analysis.[29,34]

Table 5. Key Findings of the Observational Studies

Study	Variables examined	Relationships
Abdollahi *et al.*[29]	Self-compassion and perceived stress	$r = -0.62$, $P < 0.01$
Bordbar & Shoaei[30]	Self-compassion and perceived stress	$r = -0.44$, $P < 0.001$; Self-compassion significantly predicted perceived stress ($\beta = -0.31$, $P < 0.001$)
Krutchan *et al.*[36]	Self-compassion and perceived stress	$r = 0.44$, $P < 0.001$; Perceived stress was not a significant predictor of self-compassion
Al-Ghareeb *et al.*[3]	Mindfulness and perceived stress	$r = -0.53$, $P < 0.001$; Mindfulness significantly predicted perceived stress controlling for age, employment, education, and stage of cancer ($\beta = -1.04$, $P < 0.001$)
Zhou *et al.*[34]	Mindfulness and perceived stress	$r = -0.39$, $P = 0.01$
Arefian *et al.*[31]	Mindfulness and perceived stress	$\beta = -0.43$, $P < 0.01$

Self-compassion and perceived stress

Of the 3 studies that examined the relationship between self-compassion and perceived stress, 2 reported a significant, strong to medium negative correlation ($r = -0.62$, $P < 0.01$[29]; $r = -0.44$, $P < 0.001$[30]). However, Krutchan *et al.*[36] reported a moderate positive relationship ($r = 0.44$, $P < 0.001$). Regarding prediction analysis, Bordbar and Shoaei[30] found that self-compassion significantly predicted perceived stress ($\beta = -0.31$, $P < 0.001$). Krutchan *et al.*[36] found that perceived stress was not a significant predictor of self-compassion (Table 5).

Mindfulness and perceived stress

All of the studies that examined the relationship between mindfulness and perceived stress reported a negative correlation. The Saudi study reported a significant strong negative correlation between mindfulness and perceived stress ($r = -0.53$, $P < 0.001$). After controlling for age, employment, education, and stage of cancer, mindfulness was statistically associated with perceived stress ($\beta = -1.04$; SE = 0.21; $t = -4.87$; $P < 0.001$; 95% CI, −1.47 to −0.62).[3] Other studies conducted in Iranian and Chinese populations reported similar findings, with mindfulness and perceived stress showing a significant negative correlation[31,34] (Table 5).

Experimental studies

Types of interventions

Among the 18 experimental studies, mindfulness interventions were employed in 14 studies.[7,8,18,21–24,27,28,32,33,35,37,38] Cognitively-based compassion training (CBCT) was used in 2 studies.[20,26] In 1 study,[25] self-compassion and mindfulness were combined into a single intervention. Also, 1 study used an intervention comprising designed sessions that included mindfulness and self-kindness.[19] The substantial clinical heterogeneity among interventions precludes conducting a meta-analysis. This finding indicates that mindfulness was the most commonly used intervention to reduce perceived stress among women with breast cancer. The interventions are detailed in Table 6.

Number of groups examined per study

Regarding the number of groups, the majority of studies (n = 10) used 2 groups (control and intervention).[7,18,20,21,24,26,28,33,35,37] Five studies employed a single group for pretest and posttest experimental assessments.[8,22,23,25,32] Only 2 studies had 3 groups: 2 intervention groups and 1 control group.[19,27]

Key findings

Table 1 presents the findings of the reviewed studies. This section reports the study variables as outcome measures. *Perceived stress*

The impact of mindfulness-based and compassion-based interventions on perceived stress yielded mixed, though generally favorable, outcomes across the included trials. Several RCTs reported significant reductions in perceived stress over time. For example, MBSR and a nurse-led MTCC program in China produced sustained, statistically significant decreases in stress across multiple post-baseline assessment points.[32,33]

Table 6. Description of the Interventions

Study	Intervention	Description of the intervention
Boyle *et al.*,[18] 2017; Bower *et al.*,[24] 2015	Mindful Awareness Practices (MAPs)	6-week, 2-hour group sessions covering mindfulness theory, experiential practices, and daily integration. Included daily home practice and breast cancer–specific survivorship education.
Lengacher *et al.*,[21] 2021; Sakki *et al.*,[8] 2022; Lengacher *et al.*,[22] 2009; Zhang *et al.*,[32] 2017	Mindfulness-Based Stress Reduction (MBSR)	Structured program integrating mindfulness meditation, body scans, gentle physical exercises (yoga), and daily home practice. Often 6 to 8 weeks in duration with 2- to 2.5-hour sessions. Designed to cultivate nonjudgmental awareness and ease cancer-related distress.
Ryu *et al.*,[35] 2024	Mindfulness meditation program (Headspace Guide to Meditation)	Self-guided digital application trial watching Headspace sessions on Netflix. Consisted of 8 20-minute episodes focusing on breathing, body scanning, and emotion recognition over a 4-week period.
Dodds *et al.*,[20] 2015; Gonzalez *et al.*,[26] 2018	Cognitively-Based Compassion Training (CBCT)	Organized, modular program combining contemplative exercises with cognitive strategies over an 8-week period to sequentially cultivate self-compassion, empathy, and altruistic compassion for others.
Hoffman & Baker,[25] 2023	Mindful Self-Compassion program (MSC)	An 8-week program consisting of weekly 3-hour sessions combining mindfulness and self-compassion practices, exercises, and discussions to support daily integration.
Cheung *et al.*,[19] 2017	In-person and online positive affect skill intervention	Identical across in-person and online formats; 5 weekly 1-hour sessions teaching 8 evidence-based skills (noticing positive events, gratitude, mindfulness, acts of kindness).
Lengacher *et al.*,[23] 2018	Mobile MBSR for breast cancer (mMBSR(BC))	A brief, technology-based version of standard MBSR delivering guided mindfulness practices via mobile devices to reduce stress and ease cancer-related symptoms.
Pehlivan & Eyi,[37] 2025	Mindfulness-based meditation and yoga	An 8-week program combining mindfulness, yoga, breathing techniques, and gentle movement.
Hsiao *et al.*,[38] 2025	Mindfulness and compassion-based peer counseling program	An 8-week program combining Compassion-Focused Therapy with Body-Mind-Spirit group work for breast cancer survivors to develop emotional balance and extend compassion to others.
Naskar *et al.*,[7] 2024; Svendsen *et al.*,[27] 2025; Trindade *et al.*,[28] 2020	Mindfulness-based interventions	Programs varying from 5-day brief interventions to an 8-week acceptance/compassion group program (Mind program) to a 6-month digital stress management platform offering guided meditations.
Zhang *et al.*,[33] 2022	Nurse-led Mindfulness-based Tai Chi Chuan (MTCC)	An 8-week, twice-weekly group intervention combining mindfulness with gentle Tai Chi movements.

Similarly, multiweek CBCT and mindfulness-yoga protocols were associated with significantly lower perceived stress in intervention groups by the end of their respective programs.[20,37]

Comparable reductions in stress were observed in nonrandomized, pretest/posttest, and pilot experimental designs, which demonstrated significant or marginally significant post-intervention decreases in stress levels.[7,8,23,28,35] However, maintaining long-term intervention efficacy remained challenging. One RCT reported that substantial short-term reductions in stress were not sustained at a 3-month follow-up.[24] In addition, several trials did not detect significant differences in perceived stress between intervention and control groups at their primary endpoints.[21,22,27]

Mindfulness

The cultivation of mindfulness produced heterogeneous outcomes, which appeared to depend on specific program characteristics and the timing of assessment. Several RCTs documented significant gains in mindfulness following compassion training and positive affect skills interventions, with higher posttest scores and robust within-group increases that persisted through 1- to 6-month follow-up periods.[19,20,26] Within-group analyses further highlighted large effect sizes for the "observing" facet of mindfulness following compassion training.[26] These improvements were echoed in smaller pilot and pretest/posttest experimental studies, which reported highly significant increases in overall mindfulness levels following the interventions.[7,28] Nonetheless, the trajectory of mindfulness development was not uniform across the studies. One MBSR trial found that significant improvements in mindfulness were not evident at 6 weeks but emerged at 12 weeks.[21] In contrast, multiple studies, including a digital stress management program, a single-group pilot, and a self-guided digital application trial, did not observe

significant post-intervention changes or between-group differences in mindfulness.[8,27,35]

Self-compassion

Interventions targeting mindfulness and compassion were generally associated with increases in self-compassion, although the magnitude and robustness of these effects varied. In structured randomized trials, compassion training produced significantly higher self-compassion scores relative to control conditions, with effects peaking at a 6-month follow-up and reaching a large effect size.[26] Likewise, a 5-week positive affect skills protocol, delivered both in-person and online, yielded substantial within-group increases in self-compassion from baseline to 1 month post-intervention.[19] Moreover, pretest/posttest and pilot studies reported significant post-intervention gains in self-compassion following standardized MSC and cancer-specific adapted protocols.[25,28] However, these benefits were not consistently replicated across all designs. A single-group pilot study involving breast cancer survivors with elevated depressive symptoms found no measurable changes in self-compassion following an MBSR intervention.[8]

DISCUSSION

This systematic review aimed to critically appraise quantitative studies examining the relationships among mindfulness, self-compassion, and perceived stress, drawing on 24 international studies from 10 countries that employed experimental and observational designs. The geographic distribution of the included literature indicates a marked concentration of research in the US, which accounted for the majority of controlled trials in this review. This observation aligns with broader patterns in the mindfulness and self-compassion literature, wherein Western academic institutions have historically led the formalization and empirical evaluation of secular interventions (eg, MBSR and MSC).[39]

Although these studies encompassed diverse regions, only 1 was conducted in an Arabic-speaking context (Saudi Arabia). This limits the generalizability of the findings to nursing contexts across the broader Middle Eastern region; further research is needed to enhance understanding of the Arabic context. Considering the heterogeneity of study designs, interventions, and outcome measures, conducting a meta-analysis was not feasible.

Regarding the relationship between mindfulness, self-compassion, and perceived stress, although pairwise associations among these constructs were reported across the studies, only 2 studies examined all 3 variables simultaneously.[8,28] This limitation precludes the synthesis of their holistic interrelationships and potential mediation pathways. Future research that investigates the complete triad within unified theoretical frameworks is essential for explaining comprehensive psychological mechanisms in populations with breast cancer.

Mindfulness was associated with reduced perceived stress in most of the included experimental and observational studies, except 1 RCT that reported no significant difference in perceived stress between intervention and control groups.[22] A previous systematic review and meta-analysis of 25 RCTs partially supports our findings, indicating that different mindfulness interventions were valuable in reducing perceived stress among women with breast cancer.[40] This finding is further supported by a systematic review and meta-analysis that reported the effectiveness of mindfulness-based stress reduction interventions in reducing perceived stress among students.[41] These findings highlight the importance of employing mindfulness interventions and strategies to manage how clinical and nonclinical groups perceive stress, and they underscore the need to identify factors that limit the sustainability of these interventions.

Consistent with our results, a previous systematic review and meta-analysis reported that although stress reduction was observed at short-term follow-up, this effect was not sustained at longer-term follow-up. That review further noted that stress levels returned to baseline by 3 months.[42] These observations highlight the need to refine mindfulness-based stress reduction interventions to enhance the durability of their effects.

A previous mixed-methods study that used the same PSS and SCS partially supported our findings: a mindfulness intervention reduced perceived stress among primary care physicians; however, it enhanced self-compassion, which contradicts the finding reported in one of the included studies in our systematic review.[43] This discrepancy could be attributed to physician self-selection, as those who experienced higher levels of stress were more likely to participate in the mindfulness intervention, which led to an improvement in self-compassion—a limitation noted in the previous study.

Self-compassion was negatively associated with perceived stress, and self-compassion interventions have been shown to reduce perceived stress in the included observational and experimental studies.[20,26,29,30] However, 1 study found that higher self-compassion was associated with greater perceived stress among Thai women. The authors noted limitations in the self-compassion measure, which was based on Buddhist concepts and required further validation in Thai culture.[36] This contradictory finding may reflect cultural limitations of Buddhist-

based self-compassion scales and highlights the need to adapt and validate them for non-Western populations with breast cancer.

Furthermore, regarding the measurement tools used across languages in the included studies, the PSS was employed in all studies, indicating its suitability across diverse cultural contexts. Mindfulness was assessed using 2 instruments: the FFMQ and the CAMS. The only study that employed both measures to assess mindfulness reported discrepancies in their outcomes.[21] This discrepancy highlights the need to refine existing instruments or to develop a mindfulness scale specifically tailored for breast cancer survivors. Self-compassion was assessed using the same SCS in both long and short forms, which may reflect the limited availability of validated, translated short-form versions in several languages.

Implications

The results of this systematic review may assist nursing researchers and practicing nurses who care for breast cancer survivors. These implications should be considered with caution, given the heterogeneity and the variability in study designs and statistical analyses. From a clinical standpoint, the evidence that higher levels of mindfulness and self-compassion are associated with lower perceived stress and better emotional adjustment in women with breast cancer supports incorporating structured mindfulness and self-compassion training into routine oncology and survivorship care. These interventions should be provided by trained nurses and psycho-oncology teams and customized to the treatment phase, cultural context, and the needs of patients experiencing high stress or exhibiting poor self-care behaviors.

In nursing practice and education, this highlights the importance of building skills in brief, practical mindfulness and self-compassion strategies (such as breathing exercises, body scans, and self-kindness techniques) and integrating them into patient education, group counseling, and supportive care plans.

The findings underscore the importance of well-powered, culturally diverse randomized trials that evaluate combined mindfulness and self-compassion interventions, employ standardized and breast cancer–relevant outcomes (such as perceived stress, self-care, inflammatory markers, and quality of life), include long-term follow-ups, and investigate mechanisms using advanced longitudinal and structural equation modeling approaches to clarify how and for whom these interventions are effective. Moreover, nursing researchers may benefit from these findings to identify factors influencing the sustainability of mindfulness-based interventions. In addition, the results can be used to examine the validity of the adopted interventions and to evaluate differences in effectiveness between stand-alone mindfulness or self-compassion interventions and those that integrate both components within a single program.

Strengths and limitations

This systematic review has several strengths: (a) most of the included studies were rated as high or excellent quality (> 75.1%); (b) 18 studies employed experimental designs, allowing for an examination of causal relationships; (c) a focus was maintained on 3 specific variables alongside their measurement scales; and (d) the findings from research conducted across multiple countries offer valuable insights for health care systems worldwide in addressing the psychological and mental health needs of women with breast cancer. However, this review also has several limitations. First, excluding dissertations and restricting the search to English-language publications introduces potential selection and language biases. Second, the generalizability of some included studies was limited by methodological factors, including sampling techniques and study design. Additionally, the variability in intervention types and outcome measures across studies made direct comparisons and meta-analysis challenging. Furthermore, there is a potential for publication bias, as studies with nonsignificant results may be underrepresented in the literature. These limitations should be carefully considered when interpreting the findings and applying them to practice. Future researchers should take the limitations into account when conducting umbrella reviews or meta-analyses to identify the most effective interventions.

CONCLUSION

This review systematically examined 24 quantitative studies from the Americas, Europe, and Asia, most of which employed interventions commonly originating in the US. Several studies have examined the relationships among mindfulness, self-compassion, and perceived stress; however, relatively few have investigated these constructs within a single, integrated framework. The sustainability of the effectiveness of mindfulness interventions in reducing perceived stress warrants attention. Research on these variables in Arab countries remains limited. Considering the heterogeneity of interventions and study designs, meta-analysis was not feasible. While our findings provide valuable insights, it is important to acknowledge that some of the underlying data are predominantly observational. Consequently, no direct causal inferences can be drawn from these relationships. The results derived from the cross-sectional studies should instead be regarded as a basis for future experimental research.

ETHICAL CONSIDERATIONS

As this was a review study, no ethical considerations were required.

DATA AVAILABILITY

Available from the corresponding author.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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AI DISCLOSURE

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AUTHOR CONTRIBUTION

SAA: Conceptualization, Formal analysis, Methodology, Project administration, Writing – original draft, Writing – review & editing. MYA and ZH: Formal analysis, Writing – review & editing. AA: Data curation, Validation, Writing – review & editing. All authors read and approved the manuscript.

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