



QUALITY IN SPORT

eISSN 2450-3118 · Open Access · Peer-reviewed

apcz.umk.pl/QS Nicolaus Copernicus University in Toruń



ZWOLIŃSKA, Agnieszka, GAUDYNEK-SOWAŁA, Aleksandra, ZIAJKA, Piotr, ŁAPOT, Monika, SZCZEPANEK, Gabriela, MATYAS, Anna, LURKA, Hubert, ZYSKOWSKA, Anna, STARCZEWSKI, Michał, TOMCZAK, Adam and MARKOWSKI, Bartłomiej. Exercise Modalities for the Management of Menopausal Symptoms: A Structured Narrative Review. *Quality in Sport*. 2026;70:74640. <https://doi.org/10.12775/QS.2026.70.74640>

ARTICLE TIMELINE

Received: 24.07.2026. Accepted: 17.08.2026. Published: 23.08.2026.

The journal has been awarded 20 points in the parametric evaluation by the Polish Ministry of Higher Education and Science (Annex to the announcement of 05.01.2024, No. 32553). Unique Journal Identifier: 201398. Scientific disciplines assigned: Economics and Finance (Field of Social Sciences); Management and Quality Sciences (Field of Social Sciences).

Punkty Ministerialne z 2019 – aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych). © The Authors 2026.

OPEN ACCESS · CC BY-NC-SA 4.0 This article is published with open access under the License Open Journal Systems of Nicolaus Copernicus University in Toruń, Poland, and is distributed under the terms of the Creative Commons Attribution Non-commercial Share Alike License (<http://creativecommons.org/licenses/by-nc-sa/4.0/>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the work is properly cited. The authors declare no conflict of interest regarding the publication of this paper.

Exercise Modalities for the Management of Menopausal Symptoms: A Structured Narrative Review

Agnieszka Zwolińska, ORCID <https://orcid.org/0009-0009-7339-9562>

zwolinska.agnieszka99@gmail.com

Central Teaching Hospital of the Medical University of Lodz, Łódź, Poland

Aleksandra Gaudynek-Sowała, ORCID <https://orcid.org/0009-0000-4145-8075>

olawawa41@gmail.com

Anna Gostyńska Wolski Hospital, Warsaw, Poland

Piotr Ziajka, ORCID <https://orcid.org/0009-0004-9032-3547>

ziajkapiotr@gmail.com

University Clinical Hospital No. 2 of the Medical University of Lodz, Lodz, Poland

Monika Łapot, ORCID <https://orcid.org/0009-0004-6554-9683>

monika.lapot98@gmail.com

COPERNICUS PL Sp. z o.o., St. Adalbert Hospital, Gdańsk, Poland

Gabriela Szczepanek, ORCID <https://orcid.org/0009-0005-6536-6622>

gabriela.szczepanek15@gmail.com

Medical University of Lodz, Łódź, Poland

Anna Matyas, ORCID <https://orcid.org/0009-0004-8196-3817>

annamatyas766@gmail.com

Medical University of Lodz, Łódź, Poland

Hubert Lurka, ORCID <https://orcid.org/0009-0009-5393-3852>

lurhub@gmail.com

Provincial Specialist Hospital “Megrez” in Tychy, Tychy, Poland

Anna Zyskowska, ORCID <https://orcid.org/0009-0008-7930-1063>

zyskowska.anna.x@gmail.com

Copernicus Medical Entity Ltd., Nicolaus Copernicus Hospital, Gdańsk, Poland

Michał Starczewski, ORCID <https://orcid.org/0009-0005-0057-7904>

mstarczewski5@gmail.com

Medical University of Lodz, Łódź, Poland

Adam Tomczak, ORCID <https://orcid.org/0009-0001-3714-7765>

adam.goldmann.01@gmail.com

Medical University of Lodz, Łódź, Poland

Bartłomiej Markowski ORCID <https://orcid.org/0009-0006-2538-9907>

bartekmarkowski1904@gmail.com

Medical University of Lodz, Łódź, Poland

Corresponding Author: Agnieszka Zwolińska, zwolinska.agnieszka99@gmail.com

Abstract

Background: Menopause is associated with vasomotor, psychological, somatic, and urogenital symptoms that can markedly reduce quality of life. Although hormone therapy is the most effective treatment for vasomotor symptoms, many women seek safe, non-pharmacological alternatives. Exercise is increasingly recommended; however, the benefits of specific exercise modalities remain unclear.

Aim: To compare the effects of different exercise modalities on menopausal symptoms and menopause-related quality of life in postmenopausal women.

Materials and methods: A structured narrative review of randomized controlled trials published in English between January 2015 and March 2026 was conducted using PubMed. Studies evaluating structured exercise interventions in naturally postmenopausal women were included and synthesized according to exercise modality.

Results: Nine randomized controlled trials involving 589 postmenopausal women were included. Resistance training showed the most consistent improvements in vasomotor symptoms and sleep quality, while multicomponent exercise provided broader benefits across vasomotor, psychological, and somatic domains. Pilates improved symptom severity, quality of life, and sexual function. Yoga and Qigong enhanced psychological well-being, sleep, and menopause-specific quality of life, whereas dance-based exercise improved anxiety, depression, perceived stress, and mood.

Conclusions: Structured exercise is a safe and effective non-pharmacological strategy for managing menopausal symptoms. As different exercise modalities provide complementary benefits, exercise prescription should be individualized according to symptom profile, functional capacity, and personal preferences. Further comparative randomized trials are warranted.

Keywords: menopause; menopausal symptoms; postmenopause; exercise modalities; quality of life; non-pharmacological interventions; exercise

1. Introduction

Menopause is a natural biological stage characterized by the permanent cessation of menstruation due to the loss of ovarian follicular activity. It usually occurs between 45 and 55 years of age and marks the end of a woman's reproductive period. Owing to increasing life expectancy worldwide, women currently spend approximately one-third of their lives in the postmenopausal period, making menopause an important public health issue. Although menopause is a physiological process rather than a disease, hormonal changes - particularly the decline in estrogen production - are associated with numerous physical and psychological symptoms that may substantially impair quality of life [1,2].

The prevalence and severity of menopausal symptoms vary considerably among women. Vasomotor symptoms, including hot flushes and night sweats, are the most frequently reported complaints, affecting approximately 60-80% of women during the menopausal transition. Other common manifestations include sleep disturbances, fatigue, mood changes, anxiety, depressive symptoms, musculoskeletal pain, cognitive complaints, sexual dysfunction, and urogenital symptoms. These symptoms often coexist and negatively influence daily functioning, occupational performance, interpersonal relationships, and overall health-related quality of life [2,3].

Hormone therapy remains the most effective treatment for vasomotor symptoms and is recommended for appropriately selected women. However, not all women are eligible for hormonal treatment because of contraindications such as hormone-dependent cancers or cardiovascular disease, while others prefer to avoid pharmacological therapy. Consequently, there is increasing interest in safe, accessible, and cost-effective non-pharmacological interventions that may alleviate menopausal symptoms while simultaneously improving overall health [2,4].

Regular physical activity has emerged as one of the most promising lifestyle interventions during menopause. Exercise may influence menopausal symptoms through several physiological and psychological mechanisms, including improved thermoregulation, reduced adiposity, enhanced cardiovascular fitness, improved sleep quality, increased endorphin release, modulation of autonomic nervous system activity, and reductions in stress and depressive symptoms. Furthermore, exercise contributes to maintaining muscle mass, bone health, functional capacity, and psychological well-being, all of which become increasingly important with aging [5-7].

Over the past decade, randomized controlled trials have evaluated numerous exercise modalities in postmenopausal women, including resistance training, aerobic exercise, Pilates, yoga, Qigong, dance-based exercise, and multicomponent exercise programs. Most studies report beneficial effects on menopausal symptoms, sleep quality, psychological well-being, and menopause-related quality of life. However, the magnitude and pattern of these effects appear to differ according to the type of exercise performed [8,9].

Although several systematic reviews and meta-analyses have investigated the relationship between physical activity and menopause, many focused on overall physical activity or a single exercise modality rather than comparing different forms of exercise. Furthermore, several well-designed randomized controlled trials evaluating Pilates, yoga, dance-based exercise, and multicomponent training have been published in recent years, providing new evidence that has not been comprehensively synthesized from the perspective of exercise modality.

Therefore, the aim of this narrative review was to summarize and compare the effects of different exercise modalities on menopausal symptoms and menopause-related quality of life in postmenopausal women, with particular emphasis on evidence derived from randomized controlled trials.

2. Materials and Methods

2.1. Study design

As this study was designed as a structured narrative review rather than a systematic review, the PRISMA reporting guideline was not applied. Nevertheless, a structured literature search and predefined eligibility criteria were used to enhance transparency and reproducibility. The narrative review design was chosen because the primary aim of this study was to provide a qualitative comparison of different exercise modalities rather than to quantitatively synthesize evidence.

2.2. Literature search strategy

The literature search was conducted on 20 March 2026. Only studies published between January 2015 and March 2026 were considered to identify relevant studies published in English. The search focused on studies investigating the effects of exercise interventions in postmenopausal women. Various combinations of Medical Subject Headings (MeSH) terms and free-text

keywords were used, including menopause, postmenopause, exercise, physical activity, aerobic exercise, resistance training, Pilates, yoga, Qigong, dance, multicomponent exercise, quality of life, vasomotor symptoms, and randomized controlled trial. Reference lists of relevant review articles were also screened to identify additional eligible studies.

The following search strategy was used in PubMed: ("Menopause"[Mesh] OR menopause OR postmenopause) AND ("exercise" OR "physical activity" OR "resistance training" OR aerobic OR Pilates OR yoga OR Qigong OR dance) AND ("randomized controlled trial" OR randomized).

2.3. Eligibility criteria

Studies were included if they met the following criteria:

- randomized controlled trial design;
- participants were naturally postmenopausal women;
- the intervention consisted primarily of structured physical exercise;
- menopausal symptoms and/or menopause-related quality of life were evaluated using validated outcome measures;
- full-text articles or detailed abstracts were available in English.

Studies were excluded if they:

- focused primarily on women with breast cancer or other specific clinical populations;
- investigated pharmacological or dietary interventions without a structured exercise program;
- evaluated outcomes unrelated to menopausal symptoms (e.g., bone mineral density, body composition, cardiovascular fitness alone);
- were conference abstracts, editorials, letters, or narrative opinions.

2.4. Data extraction and synthesis

Relevant information was extracted from each included study, including author, year of publication, study design, participant characteristics, exercise modality, intervention duration and frequency, outcome measures, and principal findings. Because of the considerable heterogeneity in exercise interventions, outcome measures, and study protocols, a quantitative

meta-analysis was not performed. Instead, findings were synthesized narratively and organized according to the type of exercise intervention, allowing comparison of the effects of different exercise modalities on specific menopausal symptom domains and quality of life.

3. Results

3.1 Characteristics of included studies

The included studies were categorized according to the primary exercise modality evaluated. The studies were published between 2020 and 2025 and included a total of 589 postmenopausal women. Sample sizes ranged from 30 to 125 participants, while intervention duration varied from 8 weeks to 12 months. The included studies investigated several exercise modalities, including resistance training, combined aerobic and resistance exercise, multicomponent exercise, Pilates, yoga, Qigong, and dance-based exercise.

Menopausal symptoms were most frequently assessed using the Menopause Rating Scale (MRS), although other validated instruments, including the Menopause-Specific Quality of Life questionnaire (MENQOL), Women's Health Questionnaire (WHQ), Cervantes Menopause and Health Scale, Pittsburgh Sleep Quality Index (PSQI), Short Form-36 (SF-36), Female Sexual Function Index (FSFI), and Beck Depression Inventory (BDI), were also used. Owing to substantial heterogeneity in intervention protocols and outcome measures, findings were synthesized narratively according to exercise modality.

3.2. Effects of resistance training

Resistance training was evaluated in two randomized controlled trials involving postmenopausal women experiencing moderate to severe vasomotor symptoms. The interventions consisted of supervised resistance exercise performed three times per week for 12 to 15 weeks. The primary outcomes included menopause-specific quality of life, vasomotor symptoms, sleep quality, and psychological well-being [10,11].

Both studies demonstrated beneficial effects of resistance-based exercise on menopause-related symptoms. Berin et al. reported significant improvements in menopause-specific quality of life, particularly in the domains of vasomotor symptoms, sleep disturbances, and menopausal complaints assessed using the Women's Health Questionnaire (WHQ). However, no significant

improvements were observed in generic health-related quality of life measured by the Short Form-36 questionnaire (SF-36). These findings suggest that resistance training predominantly improved symptoms directly associated with menopause rather than general health status.

Similar findings were observed in the trial evaluating a combined resistance and aerobic exercise program. Following the 12-week intervention, participants experienced significant reductions in vasomotor symptom severity and somatic complaints, accompanied by improvements in psychological well-being, physical aspects of menopause-related quality of life, and sleep quality. No significant changes were observed in the sexual domains of the menopause-specific questionnaires.

Across the included studies, resistance-based exercise was consistently associated with improvements in vasomotor symptoms, menopause-specific quality of life, and sleep quality. Evidence for improvements in generic health-related quality of life was less consistent.

3.3. Effects of multicomponent exercise

Two randomized controlled trials investigated the effects of multicomponent exercise programs combining aerobic and resistance training on menopausal symptoms and menopause-related quality of life in postmenopausal women. Intervention duration ranged from 12 to 16 weeks, with supervised exercise sessions performed two to three times per week. The evaluated outcomes included vasomotor symptoms, menopause-specific quality of life, sleep quality, psychological well-being, and somatic symptoms [11,12].

Both studies consistently demonstrated that multicomponent exercise effectively reduced menopause-related symptom burden. Significant improvements were observed in vasomotor symptoms, which represented one of the most consistently reported benefits across the interventions. In addition, participants experienced reductions in somatic and psychological symptoms together with improvements in menopause-specific quality of life.

The FLAMENCO trial further demonstrated significant improvements in psychological well-being and interpersonal relationship domains assessed using the Cervantes Menopause and Health Scale. Similarly, the combined resistance and aerobic exercise program resulted in better sleep quality and improvements in physical and psychosocial domains of menopause-related quality of life. Neither study reported meaningful improvements in sexual health outcomes.

Overall, the available evidence suggests that multicomponent exercise programs provide broad benefits across several symptom domains, including vasomotor symptoms, psychological well-being, sleep quality, and menopause-related quality of life, supporting their role as a comprehensive non-pharmacological intervention for postmenopausal women.

3.4. Effects of Pilates-based exercise

Two randomized controlled trials evaluated the effects of Pilates-based exercise programs in postmenopausal women. Both interventions lasted 8 weeks and consisted of supervised sessions performed twice weekly. The studies assessed menopausal symptoms, menopause-specific quality of life, psychological well-being, sleep quality, and sexual function using validated questionnaires [13,14].

Both studies demonstrated that Pilates-based exercise was associated with significant improvements in menopause-related outcomes. Compared with a non-exercising control group, Pilates significantly reduced the severity of menopausal symptoms, improved menopause-specific quality of life, and enhanced female sexual function. Improvements were observed across both physical and psychological domains, suggesting that Pilates may offer comprehensive benefits for postmenopausal women.

In the study comparing Clinical Pilates with aerobic exercise, both interventions produced comparable improvements in sleep quality, depressive symptoms, and several domains of health-related quality of life. Although no statistically significant differences were identified between the two exercise modalities, effect size analysis indicated greater reductions in overall menopausal symptom severity following Pilates, particularly in somatic and psychological symptoms.

Collectively, these findings suggest that Pilates is an effective non-pharmacological intervention for reducing menopause-related symptoms while improving quality of life and psychological well-being. Furthermore, current evidence indicates that Pilates provides benefits comparable to aerobic exercise, with a tendency toward greater improvements in menopause-specific symptoms.

3.5. Effects of yoga and mind–body exercise

Three randomized controlled trials evaluated the effects of mind–body exercise interventions, including yoga, Sudarshan Kriya Yoga (SKY), and Qigong, on menopausal symptoms and health-related quality of life in postmenopausal women. Intervention duration ranged from 10 weeks to 12 months, with exercise performed two or more times per week. The studies assessed menopause-related symptoms using validated instruments, including the Menopause Rating Scale (MRS) and the Menopause-Specific Quality of Life questionnaire (MENQOL), while one trial additionally evaluated changes in selected biochemical markers [15-17].

Across the included trials, mind–body exercise interventions consistently reduced the overall severity of menopausal symptoms. Significant improvements were reported in psychological, somatic, and urogenital symptom domains, accompanied by enhanced menopause-specific quality of life. Improvements in vasomotor symptoms were also observed, particularly following long-term Sudarshan Kriya Yoga practice, which demonstrated superior outcomes in the vasomotor, psychosocial, and physical domains of the MENQOL questionnaire compared with brisk walking.

Qigong was associated with broad improvements in health-related quality of life, including better physical functioning, vitality, general health, and mental health, in addition to reductions in menopausal symptom severity. Furthermore, the long-term yoga intervention resulted in increased antioxidant enzyme activity, although no significant changes were observed in reproductive hormone concentrations.

Overall, the available evidence indicates that mind–body exercise interventions effectively alleviate menopause-related symptoms while improving both physical and psychological aspects of quality of life. Although intervention protocols differed across studies, the findings consistently support yoga- and Qigong-based exercise as safe and beneficial non-pharmacological approaches for women experiencing menopausal symptoms.

3.6. Effects of dance-based exercise

One randomized controlled trial evaluated the effects of a 16-week Jazz Dance intervention on menopausal symptoms and psychological well-being in early postmenopausal women. Participants attended supervised 60-minute dance sessions twice weekly, while the control group maintained their usual lifestyle and received health education. Menopausal symptoms, anxiety, depression, perceived stress, mood, and perceptions of aging were assessed using validated questionnaires [18].

Following the intervention, women participating in the Jazz Dance program demonstrated significant reductions in overall menopausal symptom severity compared with the control group. In addition, significant improvements were observed in anxiety, depressive symptoms, perceived stress, mood, and positive perceptions of aging. Improvements were maintained at follow-up, suggesting that the beneficial effects of dance-based exercise may extend beyond the intervention period.

Overall, the available evidence indicates that dance-based exercise represents a promising non-pharmacological intervention for improving both menopause-related symptoms and psychological well-being. Although evidence is currently limited to a single randomized controlled trial, the findings highlight the potential role of enjoyable and socially engaging exercise modalities in menopause management.

3.7. Summary of findings

Across the included randomized controlled trials, structured exercise interventions consistently demonstrated beneficial effects on menopausal symptoms and menopause-related quality of life. Despite differences in intervention protocols, duration, and outcome measures, most exercise modalities were associated with improvements in at least one major symptom domain.

Resistance-based interventions most consistently reduced vasomotor symptoms and improved menopause-specific quality of life, whereas multicomponent exercise programs provided the broadest range of benefits, including improvements in vasomotor, psychological, and somatic symptoms, sleep quality, and overall well-being. Pilates-based interventions were associated with reductions in menopausal symptom severity, improvements in quality of life, and enhanced sexual function, while mind–body exercises such as yoga and Qigong demonstrated favourable effects on psychological, somatic, and urogenital symptoms as well as health-related

quality of life. Dance-based exercise also showed promising effects, particularly in improving psychological outcomes, including anxiety, depression, stress, and mood.

Collectively, the findings suggest that different exercise modalities may provide distinct but complementary benefits for postmenopausal women, supporting the use of individualized exercise programs tailored to the predominant symptoms and personal preferences of each individual.

4. Discussion

4.1 Principal findings

The present narrative review summarized evidence from randomized controlled trials evaluating the effects of different exercise modalities on menopausal symptoms and menopause-related quality of life in postmenopausal women. Overall, the findings consistently indicate that structured exercise represents an effective non-pharmacological strategy for alleviating menopausal symptoms, although the magnitude and pattern of benefits appear to differ according to the type of exercise performed.

Across the included studies, improvements were most consistently observed in vasomotor symptoms, psychological well-being, sleep quality, and menopause-specific quality of life. Resistance-based interventions demonstrated favourable effects primarily on vasomotor symptoms and sleep disturbances, whereas multicomponent exercise programs produced broader improvements encompassing psychological and somatic symptoms in addition to menopause-specific quality of life. Pilates-based interventions were associated with improvements in symptom severity, quality of life, and sexual function, while mind–body exercise modalities, including yoga and Qigong, showed consistent benefits for psychological health and overall well-being. Dance-based exercise also emerged as a promising intervention, particularly for improving psychological outcomes such as anxiety, depression, stress, and mood.

Importantly, despite variations in intervention duration, exercise intensity, and assessment tools, none of the included studies reported adverse effects related to exercise participation. This observation supports current recommendations encouraging regular physical activity as a safe therapeutic option for women experiencing menopausal symptoms. At the same time, the

heterogeneity of exercise protocols and outcome measures limits direct comparisons between interventions and precludes conclusions regarding the superiority of any single exercise modality.

Taken together, the available evidence suggests that exercise prescription during menopause should not rely solely on increasing overall physical activity levels but should also consider the predominant symptoms, functional capacity, and individual preferences of each woman. This individualized approach may optimize adherence to exercise programs while maximizing their potential benefits for physical and psychological health.

4.2. Comparison with previous evidence

The findings of the present review are generally consistent with the growing body of evidence supporting exercise as an effective non-pharmacological intervention for managing menopausal symptoms [19-21]. Previous systematic reviews and meta-analyses have consistently demonstrated that regular physical activity contributes to improvements in vasomotor symptoms, sleep quality, psychological well-being, and health-related quality of life, although the reported magnitude of these effects varies considerably across studies. The heterogeneity of exercise protocols, participant characteristics, intervention duration, and outcome measures has frequently limited direct comparisons between studies and complicated the identification of the most effective exercise modality.

An important observation emerging from the present review is that different exercise modalities appear to influence different domains of menopausal health. While previous reviews have generally evaluated exercise as a single intervention category, the available randomized controlled trials suggest that resistance training, multicomponent exercise, Pilates, yoga, Qigong, and dance-based exercise may provide distinct but complementary benefits. This perspective extends previous evidence by emphasizing that exercise prescription during menopause may benefit from considering the predominant symptom profile rather than recommending physical activity in general.

Resistance-based exercise demonstrated particularly consistent improvements in vasomotor symptoms and menopause-specific quality of life across the included studies. These findings are in agreement with previous systematic reviews reporting favourable effects of resistance training on menopausal symptoms and functional health in postmenopausal women [19,23].

Although improvements in generic health-related quality of life remain less consistent, resistance exercise appears to be a promising intervention for women primarily experiencing vasomotor symptoms.

Similarly, multicomponent exercise programs combining aerobic and resistance training produced improvements across multiple symptom domains, including vasomotor, somatic, and psychological symptoms together with better sleep quality. Such broad effects may reflect the complementary physiological adaptations induced by combining different exercise modalities. Previous overview reviews have likewise suggested that interventions incorporating several components often produce more comprehensive health benefits than programs based on a single exercise modality [8,20].

Mind–body exercise interventions also demonstrated consistent benefits, particularly regarding psychological well-being and quality of life. Improvements observed following yoga and Qigong are consistent with previous reviews indicating that these interventions may effectively reduce perceived stress, anxiety, depressive symptoms, and sleep disturbances while simultaneously improving menopause-related quality of life [8,20]. Their relatively low physical demands may additionally increase accessibility and long-term adherence among women who are less physically active or have musculoskeletal limitations.

Pilates-based exercise represents another promising intervention identified in the present review. In addition to improving menopause-related symptoms and quality of life, Pilates was associated with improvements in sexual function, an outcome that has received relatively limited attention in previous exercise studies. Although evidence remains limited because of the small number of available randomized trials, these findings suggest that Pilates may provide benefits extending beyond traditional physical outcomes.

Overall, the findings of the present review support previous evidence that exercise should be considered an integral component of menopause management [8,19-21]. However, the available randomized controlled trials further suggest that exercise prescription may be optimized by selecting modalities that best address the predominant physical or psychological symptoms experienced by individual women. Future comparative studies are required to determine whether specific exercise modalities offer clinically meaningful advantages over others for particular symptom profiles.

4.3. Potential mechanisms underlying the effects of exercise

The beneficial effects of exercise on menopausal symptoms are likely multifactorial and involve complex physiological and psychological mechanisms. Although the exact pathways remain incompletely understood, current evidence suggests that regular physical activity influences thermoregulation, neuroendocrine function, sleep quality, psychological health, body composition, and overall functional capacity, all of which may contribute to alleviating menopause-related symptoms [20,24].

One of the most consistently reported benefits across the included studies was the reduction in vasomotor symptoms, particularly following resistance and multicomponent exercise interventions. Vasomotor symptoms are believed to result from alterations in hypothalamic thermoregulatory control associated with estrogen deficiency. Regular exercise has been proposed to improve thermoregulatory stability through adaptations in cardiovascular function, enhanced heat dissipation, and improved autonomic nervous system regulation. In addition, resistance exercise may stimulate the release of endogenous opioids, including β -endorphins, which have been suggested to influence hypothalamic thermoregulation and reduce the frequency or severity of hot flashes. Although these mechanisms remain hypothetical, they are supported by experimental observations reported in previous clinical studies.

Psychological improvements observed after yoga, Pilates, Qigong, and dance-based exercise may be explained by both physiological and behavioural mechanisms. Mind–body exercise interventions combine moderate physical activity with breathing techniques, concentration, relaxation, and body awareness, which may reduce sympathetic nervous system activity and perceived stress. These interventions have also been associated with improvements in emotional regulation, self-efficacy, and overall psychological resilience, potentially contributing to reductions in anxiety and depressive symptoms frequently experienced during the menopausal transition [20,24].

Improved sleep quality represents another important mechanism through which exercise may enhance menopause-related quality of life. Sleep disturbances in postmenopausal women are often closely related to nocturnal vasomotor symptoms, psychological distress, and reduced physical fitness. Therefore, improvements in sleep observed following resistance training and multicomponent exercise may reflect both direct effects of regular physical activity on sleep

regulation and indirect effects mediated by reductions in vasomotor symptoms and psychological distress [24].

The beneficial effects of exercise may also be partially explained by improvements in physical function and body composition. Maintenance of muscle mass, muscular strength, balance, and functional capacity becomes increasingly important during the postmenopausal period because of age-related sarcopenia and declining physical performance. Enhanced physical fitness may improve confidence in daily activities, reduce fatigue, and contribute to better self-perceived health, thereby positively influencing overall quality of life [22,24].

Interestingly, one of the included studies reported increased antioxidant enzyme activity following long-term yoga practice, suggesting that reductions in oxidative stress may represent an additional biological mechanism contributing to symptom improvement. However, no significant hormonal changes were observed, indicating that the beneficial effects of exercise are unlikely to result from direct restoration of estrogen production. Instead, exercise appears to improve women's ability to cope with menopause-related physiological changes through multiple interacting pathways.

Taken together, the available evidence suggests that the effectiveness of exercise is unlikely to depend on a single biological mechanism. Rather, different exercise modalities may exert complementary effects through distinct physiological and psychological pathways, which may explain why individual interventions may preferentially improve specific symptom domains.

4.4. Clinical implications

The findings of the present review have several practical implications for healthcare professionals involved in the care of postmenopausal women. Although current clinical guidelines recommend regular physical activity during menopause, they generally provide limited guidance regarding the selection of specific exercise modalities according to individual symptom profiles [2,24]. The evidence synthesized in this review suggests that different forms of exercise may offer distinct benefits, supporting a more individualized approach to exercise prescription during menopause.

Resistance-based exercise appears particularly suitable for women experiencing prominent vasomotor symptoms and sleep disturbances, while multicomponent exercise programs may be

appropriate for individuals presenting with multiple concurrent symptoms because of their broad effects on physical, psychological, and menopause-specific outcomes. In contrast, Pilates, yoga, and Qigong may represent valuable options for women whose primary concerns include psychological distress, reduced quality of life, or impaired physical function. Pilates may additionally be considered for women reporting sexual dysfunction, although further high-quality studies are required to confirm this observation.

An individualized approach to exercise prescription may also improve long-term adherence. Personal preferences, previous exercise experience, physical fitness, musculoskeletal limitations, and access to exercise facilities should all be considered when recommending physical activity during menopause. Since adherence is one of the strongest predictors of long-term health benefits, selecting an enjoyable and feasible exercise modality may be as important as selecting the theoretically most effective intervention.

Importantly, none of the randomized controlled trials included in this review reported serious adverse events related to exercise participation, further supporting the safety of structured physical activity in healthy postmenopausal women. Consequently, exercise should be considered not only as a strategy for improving physical fitness but also as an important component of comprehensive menopause management aimed at enhancing overall health and quality of life [2].

4.5. Strengths and limitations

The present review has several strengths that should be acknowledged. First, it focused exclusively on randomized controlled trials, which represent the highest level of evidence for evaluating the effectiveness of exercise interventions. By limiting the review to randomized studies, the influence of confounding factors and selection bias was reduced compared with reviews including observational research.

A further strength is the comparison of different exercise modalities rather than considering physical activity as a single intervention. This approach enabled a more comprehensive evaluation of the potential benefits associated with resistance training, multicomponent exercise, Pilates, yoga, Qigong, and dance-based exercise. Consequently, the review provides a broader perspective on how specific exercise modalities may influence different domains of

menopausal health, including vasomotor, psychological, somatic, and urogenital symptoms, as well as menopause-related quality of life.

In addition, several recently published randomized controlled trials were included, allowing this review to incorporate the latest available evidence. The inclusion of newer studies evaluating Pilates and other mind–body exercise modalities expands the current understanding of non-pharmacological approaches to menopause management and complements findings reported in previous systematic reviews and meta-analyses.

Nevertheless, several limitations should be considered when interpreting the findings. First, the literature search was limited to the PubMed database and English-language publications, which may have resulted in the omission of relevant studies indexed elsewhere or published in other languages. Second, considerable heterogeneity existed among the included trials with respect to participant characteristics, intervention duration, exercise intensity, outcome measures, and follow-up periods. This variability precluded quantitative synthesis and limited direct comparisons between exercise modalities.

Another limitation is that several included randomized controlled trials enrolled relatively small samples, reducing statistical power and potentially limiting the generalizability of the findings. Furthermore, because this review followed a narrative rather than systematic methodology, the synthesis inevitably involved a degree of subjective interpretation despite the use of predefined eligibility criteria and a structured search strategy.

Overall, although these limitations should be acknowledged, the available evidence consistently supports the beneficial role of structured exercise in menopause management. Future well-designed randomized controlled trials directly comparing different exercise modalities using standardized outcome measures are needed to strengthen the evidence base and facilitate more precise exercise recommendations for postmenopausal women.

5. Conclusions

Regular exercise appears to be an effective non-pharmacological strategy for alleviating menopausal symptoms and improving menopause-related quality of life in postmenopausal women. Across the included randomized controlled trials, resistance training, multicomponent

exercise, Pilates, yoga, Qigong, and dance-based exercise were all associated with beneficial effects, although the magnitude and pattern of improvement varied among exercise modalities.

The findings of this review suggest that different forms of exercise may preferentially influence specific symptom domains. Current evidence suggests that resistance and multicomponent exercise may provide consistent benefits for vasomotor symptoms and menopause-specific quality of life, whereas mind–body exercise modalities were more consistently associated with improvements in psychological well-being. Pilates additionally showed promising effects on sexual function, highlighting its potential as a comprehensive intervention for postmenopausal women.

Rather than supporting a single optimal exercise modality, the available evidence suggests that exercise prescription during menopause should be individualized according to women's predominant symptoms, functional capacity, health status, and personal preferences. Such an approach may improve adherence to regular physical activity while maximizing its potential health benefits.

Although additional high-quality comparative trials are required, the current evidence supports the integration of structured exercise into routine menopause management as a safe, accessible, and effective component of comprehensive women's healthcare.

Disclosure

Supplementary Materials: Not Applicable

Author Contributions

Conceptualization: Agnieszka Zwolińska, Aleksandra Gaudynek-Sowała

Formal analysis: Agnieszka Zwolińska, Piotr Ziajka, Monika Łapot

Investigation: Gabriela Szczepanek, Anna Matyas, Hubert Lurka, Adam Tomczak, Bartłomiej Markowski

Methodology: Agnieszka Zwolińska, Piotr Ziajka, Monika Łapot, Anna Zyskowska, Michał Starczewski

Resources: Gabriela Szczepanek, Anna Matyas, Hubert Lurka, Adam Tomczak, Bartłomiej Markowski

Supervision: Agnieszka Zwolińska

Visualization: Monika Łapot, Anna Matyas, Michał Starczewski

Writing - rough preparation: Agnieszka Zwolińska, Aleksandra Gaudynek-Sowała, Piotr Ziajka
Writing - review & editing: Agnieszka Zwolińska, Aleksandra Gaudynek-Sowała, Gabriela Szczepanek, Anna Zyskowska, Michał Starczewski, Adam Tomczak, Bartłomiej Markowski
All authors have read and agreed with the published version of manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: All data analyzed in this study are included in the published articles cited in the References section. No new datasets were generated or analyzed for this review.

Conflicts of Interest: The authors declare no conflicts of interest.

Declaration of the use of generative AI and AI-assisted technologies in the writing process

In preparing this work, the authors used ChatGPT (OpenAI) to improve language quality, text organization, and editorial consistency. All scientific content, interpretation of the literature, and final manuscript revisions were reviewed and verified by the authors, who take full responsibility for the content of the publication.

References

1. Gatenby C, Simpson P. Menopause: Physiology, definitions, and symptoms. *Best Pract Res Clin Endocrinol Metab.* 2024;38(1):101855. doi:10.1016/j.beem.2023.101855.
2. The North American Menopause Society. The 2022 hormone therapy position statement of The North American Menopause Society. *Menopause.* 2022;29(7):767-794. doi:10.1097/GME.0000000000002028.
3. Pop AL, Nasui BA, Bors RG, Penes ON, Prada AG, Clotea E, et al. The current strategy in hormonal and non-hormonal therapies in menopause: a comprehensive review. *Life (Basel).* 2023;13(3):649. doi:10.3390/life13030649.
4. The North American Menopause Society. The 2023 nonhormone therapy position statement of The North American Menopause Society. *Menopause.* 2023;30(6):573-590. doi:10.1097/GME.0000000000002200.

5. Anekwe CV, Cano A, Mulligan J, Ang SB, Johnson CN, Panay N, et al. The role of lifestyle medicine in menopausal health: a review of non-pharmacologic interventions. *Climacteric*. 2025;28(5):478-496. doi:10.1080/13697137.2025.2548806.
6. Nguyen TM, Do TTT, Tran TN, Kim JH. Exercise and Quality of Life in Women with Menopausal Symptoms: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Int J Environ Res Public Health*. 2020;17(19):7049. doi:10.3390/ijerph17197049.
7. Choudhary A, Bansal K. Menopause and movement: exercise for better sleep and psychological well-being—a systematic review. *Menopause*. 2025;32(11):1063-1071. doi:10.1097/GME.0000000000002610.
8. Money A, MacKenzie A, Norman G, Eost-Telling C, Harris D, McDermott J, et al. The impact of physical activity and exercise interventions on symptoms for women experiencing menopause: overview of reviews. *BMC Womens Health*. 2024;24:399. doi:10.1186/s12905-024-03243-4.
9. Trujillo-Muñoz PJ, Sánchez-Ojeda MA, Rodríguez-Huamán EC, Mezyani-Haddu K, Hoyo-Guillot I, Navarro-Prado S. Effects of physical exercise on symptoms and quality of life in women in climacteric: a systematic review and meta-analysis. *Healthcare (Basel)*. 2025;13(6):644. doi:10.3390/healthcare13060644.
10. Berin E, Hammar M, Lindblom H, Lindh-Åstrand L, Spetz Holm AC. Effects of resistance training on quality of life in postmenopausal women with vasomotor symptoms. *Climacteric*. 2022;25(3):264-270. doi:10.1080/13697137.2021.1941849.
11. Yilmaz Babacan G, Guler Cekic S, Candan Algun Z, Durmusoglu AF. Effects of exercise training on vasomotor symptoms and quality of life in postmenopausal women: a randomized controlled trial. *BMC Womens Health*. 2025;25(1):612. doi:10.1186/s12905-025-04231-y.
12. Baena-García L, Flor-Aleman M, Marín-Jiménez N, Aranda P, Aparicio VA. A 16-week multicomponent exercise training program improves menopause-related symptoms in middle-aged women: the FLAMENCO project randomized control trial. *Menopause*. 2022;29(5):537-544. doi:10.1097/GME.0000000000001947.
13. Yiğit Kocamer M, Atilgan E. Investigating the effects of Pilates exercises on menopausal symptoms and sexual dysfunction in postmenopausal women: a randomized controlled trial. *Medicine (Baltimore)*. 2025;104(23):e42689. doi:10.1097/MD.00000000000042689.

14. Can B, Usgu S, Usgu G. Comparative effects of Clinical Pilates training and aerobic exercise on menopausal symptoms, quality of life, sleep and depression: a randomised controlled trial. *BJOG*. 2026. doi:10.1111/1471-0528.70203.
15. Abiç A, Yilmaz Vefikuluçay D. The effect of yoga on menopause symptoms: a randomized controlled trial. *Holist Nurs Pract*. 2024;38(3):138-147. doi:10.1097/HNP.0000000000000646.
16. Swain D, Nanda P, Das H. Impact of yoga intervention on menopausal symptoms-specific quality of life and changes in hormonal level among menopausal women. *J Obstet Gynaecol Res*. 2021;47(10):3669-3676. doi:10.1111/jog.14939.
17. Carcelén-Fraile MDC, Hita-Contreras F, Martínez-Amat A, Brandão Loureiro V, Marques de Loureiro NE, Jiménez-García JD, et al. Impact of Qigong exercises on the severity of the menopausal symptoms and health-related quality of life: a randomised controlled trial. *Eur J Sport Sci*. 2023;23(4):656-664. doi:10.1080/17461391.2022.2044915.
18. Martins JBB, Fausto DY, Sperandio Flores F, Sonza A, Matias TS, Coutinho de Azevedo Guimarães A. Jazz Dance on menopausal symptoms and psychological aspects: a randomized clinical trial pilot study with follow-up. *Res Q Exerc Sport*. 2025;96(2):316-326. doi:10.1080/02701367.2024.2406401.
19. Sá KMM, Silva GR, Martins UK, Colovati MES, Crizol GR, Riera R, et al. Resistance training for postmenopausal women: systematic review and meta-analysis. *Menopause*. 2023;30(1):108-116. doi:10.1097/GME.0000000000002079.
20. Fausto DY, Leitão AE, Silveira J, Martins JBB, Dominski FH, Guimarães ACA. An umbrella systematic review of the effect of physical exercise on mental health of women in menopause. *Menopause*. 2023;30(2):225-234. doi:10.1097/GME.0000000000002105.
21. Liu T, Chen S, Mielke GI, McCarthy AL, Bailey TG. Effects of exercise on vasomotor symptoms in menopausal women: a systematic review and meta-analysis. *Climacteric*. 2022;25(6):552-561. doi:10.1080/13697137.2022.2097865.
22. Fausto DY, Martins JBB, Machado AC, Saraiva PS, Pelegrini A, Guimarães ACA. What is the evidence for the effect of physical exercise on bone health in menopausal women? An umbrella systematic review. *Climacteric*. 2023;26(6):550-559. doi:10.1080/13697137.2023.2249819.
23. Capel-Alcaraz AM, García-López H, Castro-Sánchez AM, Fernández-Sánchez M, Lara-Palomo IC. The Efficacy of Strength Exercises for Reducing the Symptoms of Menopause: A Systematic Review. *J Clin Med*. 2023;12(2):548. doi:10.3390/jcm12020548.

24. Hulteen RM, Marlatt KL, Allerton TD, Lovre D. Detrimental Changes in Health during Menopause: The Role of Physical Activity. *Int J Sports Med.* 2023;44(6):389-396. doi:10.1055/a-2003-9406.