

Effects of Pilates on breast cancer: A systematic review

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Abstract

This systematic literature review mapped studies examining the use of the Pilates method in the rehabilitation of women with breast cancer, with the aim of clarifying its contribution to functional recovery and overall well-being. The literature search covered the SCOPUS, Web of Science, and PubMed databases, and included publications from May 2004 through May 2025. The search used the search string “Pilates” AND “breast cancer”. Sixteen studies met the inclusion criteria and were analyzed descriptively and thematically across three dimensions: (i) the relationship between Pilates and quality of life; (ii) the role of Pilates in promoting functional improvement; and (iii) its effects on psychological well-being. Brazil was identified as the country with the highest number of studies in this field, with methodologies primarily based on questionnaires and physical tests. The results showed an increase in scientific interest in this area and highlighted the positive effects of the Pilates method in breast cancer rehabilitation, with significant impacts on patients’ physical, emotional, and psychological recovery. Most studies identified improvements in quality of life, including reductions in pain, fatigue, anxiety, and depressive symptoms, as well as gains in muscular strength, flexibility, mobility, balance, and postural alignment. The findings also emphasized the role of Pilates as a mind–body intervention that promotes self-esteem, body awareness, and emotional well-being throughout the rehabilitation process. Furthermore, the integration of breathing techniques, motor control, and mental focus makes Pilates a distinctive therapeutic approach capable of supporting both physical and psychological recovery. The review suggests that Pilates may represent a safe, feasible, and effective complementary strategy within multidisciplinary oncological rehabilitation programs. However, further longitudinal and high-quality randomized studies are needed to strengthen the scientific evidence and establish standardized intervention protocols for women with breast cancer.

Keywords: Pilates; Breast cancer; Quality of life; Rehabilitation.

Introduction

Breast cancer (BC) remains one of the most prevalent types of cancer, accounting for a significant proportion of cancer cases diagnosed worldwide, according to the World Health Organization (WHO, 2021). According to this organization, approximately 2.3 million women were diagnosed with BC in 2022, making it the most common cancer among women. Despite advances in treatment and early diagnosis, women who survive this disease face a range of post-treatment challenges. Conventional therapies, such as chemotherapy, radiotherapy, and surgery, although effective in controlling the disease, often cause debilitating side effects that negatively affect patients’ quality of life (Leite et al., 2024; Bertoli et al., 2025).

The choice of treatment depends on the stage of the disease, tumor type, and the patient’s overall health condition (Lôbo et al., 2014). However, despite medical progress, BC treatment continues to involve substantial changes in patients’ lifestyles and daily routines, making the integration of non-pharmacological interventions essential to support recovery and rehabilitation. Common effects include loss of mobility, changes in body image, increased fatigue, sleep disturbances, and depression, all of which contribute to a significant reduction in the quality of life (QoL) of women facing this condition (Odynets et al., 2019; Ruddy et al., 2017). The consequences of BC extend beyond these symptoms and may include infertility, secondary leukemia, early menopause, sexual dysfunction, weight gain, and other health problems. These consequences generate significant physical and emotional distress, contributing to a cycle of vulnerability that may compromise the recovery process. Nevertheless, the 5-year survival rate has increased considerably, largely due to advances in medical science (Christiansen et al., 2018; Eggemann et al., 2018).

The benefits of physical exercise began to be reported by Winningham and colleagues in 1989, particularly in relation to quality of life. These authors observed positive effects in a group that performed aerobic physical activity on a bicycle at intensities of between 65% and 80% of maximum heart rate, for 20 to 30 minutes per session, three times per week (Winningham et al., 1989). However, physical activity levels during

treatment tend to be very low and often remain low even after treatment completion. Only 34%, 39.5%, and 21.4% of individuals maintain the minimum recommended physical activity levels 2, 5, and 10 years after treatment, respectively (Mason et al., 2013). Physical inactivity and increased body mass and adiposity are risk factors for disease recurrence and the development of other metabolic diseases (Maliniak et al., 2018). Reduced physical activity during treatment is often related to patients' decreased ability to maintain their usual activity levels because of treatment side effects. In breast cancer patients, chemotherapy-related effects include gastrointestinal disturbances, dyspnea, immune system suppression, neuropathy, nausea, vomiting, insomnia, loss of appetite, fatigue, cognitive impairment, and cardiac problems, largely associated with treatment toxicity (Shapiro & Recht, 2001).

These side effects negatively affect women's quality of life during and after treatment, limiting functional capacity and the ability to perform daily activities and, consequently, compromising return to work among those of working age (Schmitz et al., 2012; Zeng et al., 2014). In this context, rehabilitation interventions such as physical exercise have gained increasing attention in the literature as strategies to mitigate these side effects and improve patients' functional and emotional recovery (e.g., Kloubec, 2010). Physical exercise is therefore recognized as an important component in preventing treatment-related impairments; however, there remains insufficient access to appropriate programs and, among patients, fear of engaging in exercise without proper guidance (Kim & Han, 2020). Courneya et al. (2014) reported higher survival rates at 96 months among women who exercised during chemotherapy, as well as lower recurrence rates among physically active patients.

Among the various exercise interventions, Pilates has emerged as a promising complementary approach for this population (Han et al., 2024; Keays et al., 2008). By integrating muscular strengthening, flexibility, postural control, breathing, and mind-body awareness, Pilates may be particularly relevant to the rehabilitation and recovery of women with BC, whose needs often extend beyond isolated physical impairments and encompass functional and psychosocial dimensions.

The Pilates method may contribute to breast cancer recovery not only through its physiological benefits but also by promoting self-esteem, confidence, and overall well-being. In cases involving surgical intervention, exercises may support muscular recovery and help restore mobility that has been compromised following treatment. A particularly relevant aspect is thoracic spine mobility, with exercises involving spinal extension, rotation, and flexion potentially contributing to the progressive restoration of surrounding musculature. Pilates practice has also been associated with improvements in self-esteem, confidence, mood, body image, and a sense of independence and control, as individuals take an active role in their recovery. Breathing, as a core principle of the Pilates method, connects movement and body awareness and may facilitate tension release. Overall, this approach has been associated with gains in muscular strength, mobility, joint range of motion, and flexibility (Bertoli et al., 2023).

These characteristics are particularly relevant given the persistent physical and psychosocial consequences of BC treatment and the need for safe, integrative, and appropriately guided rehabilitation strategies. Understanding the available evidence on Pilates may therefore help clarify its potential role within oncological rehabilitation and provide information that can support health and exercise professionals in the development of more appropriate rehabilitation strategies and future evidence-based Pilates protocols for women with BC.

What do previous literature reviews tell us?

To conceptually define the focus of the present review, and in accordance with the PRISMA 2020 guidelines regarding the consideration of previous studies, a systematic identification and analysis of review studies investigating the relationship between the practice of the Pilates method and breast cancer was conducted. The search was carried out using the same databases adopted in this review (SCOPUS, Web of Science, and PubMed).

Since 2015, four review studies have been published to evaluate the effects of Pilates in women diagnosed with BC. The first review, conducted in Australia, focused on randomized clinical trials and concluded that the Pilates method may positively contribute to recovery, particularly in pain relief, improvement in quality of life, and increased lower limb strength. Espíndula et al. (2017) analyzed five studies and found that both Pilates and home-based exercise were more effective than no exercise, with significantly greater improvements observed in the Pilates group.

Pinto-Carral et al. (2018) conducted a systematic review with meta-analysis, also based on five clinical trials, and concluded that Pilates showed superior effects compared with other interventions in reducing symptoms associated with BC. The authors further emphasized that Pilates, as a mind-body approach within complementary and alternative medicine, represents a promising strategy because it combines low- to moderate-intensity physical exercise with mindfulness practices, thereby offering the potential to mitigate both the physical and psychological sequelae associated with BC treatment.

The most recent review, conducted by Morilla et al. (2022), evaluated 69 articles retrieved from the PubMed, SciELO, and Scopus databases. The results indicated that the Pilates method may be effective in

promoting functional recovery in women with BC. However, the authors also acknowledged methodological limitations in the included studies, as well as the scarcity of systematic and high-quality research in this field.

Overall, previous reviews suggest potential benefits of Pilates in the context of oncological rehabilitation. However, the available evidence remains limited by methodological heterogeneity, differences in intervention protocols and outcome measures, and a scarcity of high-quality studies. Furthermore, the emergence of additional studies in recent years provides a rationale for updating and expanding the synthesis of the available evidence. Therefore, an updated review is needed to clarify the current state of knowledge, integrate recent findings, identify persistent research gaps, and better understand the potential contribution of Pilates to the physical, functional, and psychological recovery of women with BC. Such a synthesis may also provide a stronger evidence base for future research and inform the development of rehabilitation strategies in clinical and exercise settings.

Accordingly, the aim of this systematic review was to map and synthesize the available evidence on the use of Pilates in the rehabilitation of women with breast cancer, with particular attention to its contribution to quality of life, functional capacity, and psychological well-being. To address this aim, studies investigating Pilates interventions in women with BC were systematically identified, selected, and analyzed, allowing the characteristics of the existing evidence, the main reported outcomes, and the remaining knowledge gaps to be examined.

Methods

This systematic review was conducted in accordance with the guidelines proposed by Petticrew and Roberts (2006) and incorporated the PRISMA 2020 checklist for systematic reviews (Page et al., 2021), including the component of previous studies described in the earlier section on prior literature reviews. The five-step approach comprised: (i) formulation of search terms; (ii) selection of databases; (iii) execution of the literature search; (iv) definition and application of eligibility criteria; and (v) data extraction and synthesis.

The formulation of search terms and eligibility criteria aimed to identify studies focusing on breast cancer (BC) and Pilates. The period from 2005 to May 2025 was defined for two reasons: (a) no studies prior to 2005 were identified linking Pilates and BC; and (b) to ensure the inclusion of the most recent available evidence.

Procedures

Databases and search terms

Two independent reviewers conducted the search in the SCOPUS, Web of Science, and PubMed databases, selected because they index relevant international journals in physical exercise, rehabilitation, and health. The search expression applied to the title, abstract, and keywords was “pilates” AND “breast cancer”. Any discrepancies between reviewers were resolved through consensus.

Eligibility criteria

To be included, studies had to meet the following criteria: full-text articles written in English, Portuguese, or Spanish; published in peer-reviewed academic journals; and using Pilates as the primary intervention in women with BC, regardless of whether they had undergone mastectomy. Additionally, studies had to report at least one of the following outcomes: range of motion, strength, quality of life, well-being, mood, or Matwork protocols.

Studies were excluded if they did not simultaneously focus on Pilates and BC; combined Pilates with more than two other physical activities (e.g., yoga, tai chi); addressed exclusively lymphedema, respiratory function, or fatigue; or investigated cancers other than BC.

Study selection

The initial search identified 138 records (SCOPUS = 62; Web of Science = 42; PubMed = 30). After removing duplicates, 82 articles remained. Screening of titles and abstracts, followed by full-text review according to the eligibility criteria, resulted in the inclusion of 16 studies for analysis. The flowchart of the selection process is presented in Figure 1.

Data extraction and synthesis

Data extraction was performed using a standardized form in Microsoft Excel, in which methodological characteristics, participant profiles, descriptions of the Pilates protocol, and assessed outcomes were recorded. Two reviewers independently extracted and verified the data, and any discrepancies were resolved by consensus, ensuring the reliability of the process.

Due to the heterogeneity of study designs and outcome measures, a meta-analysis was not feasible; therefore, a thematic synthesis was conducted.

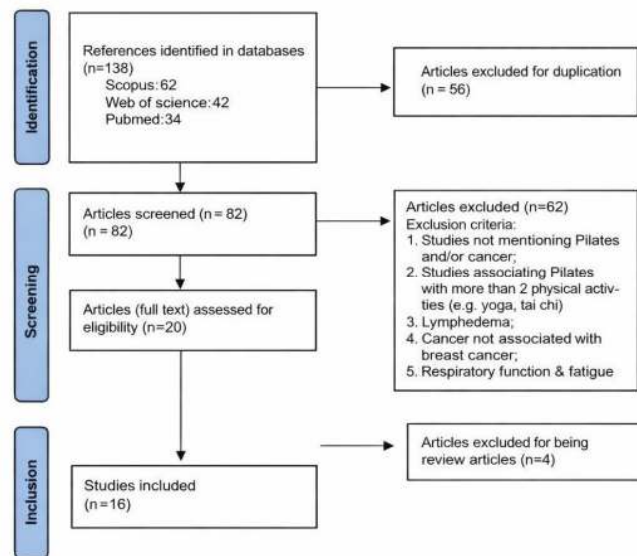


Figure 1 – Flow diagram of the analysis.

Analysis Procedures

The 16 included articles were subjected to an inductive thematic analysis, in accordance with the framework proposed by Braun and Clarke (2012). Although the original model comprises six phases, a condensed version with four operational steps was adopted, appropriate to the objective of the present review: (i) Familiarization – a full reading of each article, with annotation of the main conclusions; (ii) Initial coding – compilation of the conclusions into a Word document and assignment of preliminary codes to each relevant excerpt; (iii) Grouping of codes – iterative reorganization of the codes into broader topics, discussed between the two reviewers until consensus was reached; and (iv) Theme generation – synthesis of the topics into final thematic categories, from which the results and discussion were structured.

To strengthen analytical rigor, Cohen's Kappa coefficient was calculated ($K = 0.82$), indicating substantial agreement between reviewers in code assignment. Critical review and refinement of the themes were conducted in two additional rounds, ensuring the internal coherence and external distinction of each theme. The process culminated in the identification of three central themes: (1) Pilates and quality of life; (2) Pilates and functional capacity; and (3) Pilates and psychological well-being.

Descriptive analysis

Among the sixteen studies identified, the year with the highest number of publications on the topic was 2021 (4 articles), followed by 2022 and 2023 (both with 2 articles). Undoubtedly, Brazil is the country with the highest number of studies (11).

The authors who stand out most in this field are Leonessa Boing, Tatiana Fretta, and Adriana Guimarães, who produced six publications between 2020 and 2024.

Regarding the types of instruments used, the following stand out:

(i) Objective (physical): goniometer, dynamometer, measuring tape, 6MWT (Six-Minute Walk Test), and spirometry.

(ii) Subjective (psychological / QoL): FACT-B (Functional Assessment of Cancer Therapy – Breast), EORTC QLQ-C30 (European Organization for Research and Treatment of Cancer Quality of Life Questionnaire), POMS (Profile of Mood States), HADS (Hospital Anxiety and Depression Scale), and BIS (Body Image Scale);

(iii) Adherence monitoring: participation diaries and attendance records.

Brazilian studies tend to combine physical and psychosocial instruments, with a strong emphasis on supervised exercise. The U.S. study conducted in 2012 was pioneering in integrating multiple domains (physical, psychological, and quality of life). The Ukrainian study conducted in 2019 (Briskin, Odynets) focused primarily on cardiorespiratory function and mobility.

The open and emergent analysis (Table 1) of the 16 studies included in this review showed that almost all studies examining the effects of Pilates in women with breast cancer (BC) associated Pilates with more than one quality-of-life (QoL) parameter. Most of the studies analyzed (Brazil, USA, Ukraine, Turkey, Italy, and Canada) shared similar objectives: to evaluate the effectiveness of physical exercise or rehabilitation programs in

breast cancer survivors, and to measure quality of life, physical function, joint mobility, body image, and psychological aspects (mood, anxiety, and depression). A clear trend was identified in Brazilian studies toward emphasizing personalized and multimodal interventions, combining resistance exercises, stretching, yoga, aquatic exercise, and Pilates.

It is also important to note that only one study investigated machine-based Pilates (Rezende et al., 2022), while all other studies focused on Matwork Pilates (performed on the mat).

Table 1
Summary of Studies on Pilates and Breast Cancer

Country (Year)	Author(s)	Objective	n	Instruments	Main Findings
Brazil (2025)	Bertoli et al.	Effect of 24-week Mat Pilates (3x/week) on quality of life during hormone therapy	43	SF-36; EORTC QLQ-C30; QLQ-BR23	Improved emotional, social, and mental health domains; no significant differences in EORTC-specific measures
Brazil (2024)	Leite et al.	Effect of Pilates on quality of life, fatigue, and sleep quality	34	EORTC QLQ-C30; FACT-F; PSQI	Improvements in quality of life, fatigue, and sleep quality
Brazil (2023)	Boing et al.	Effects of Pilates or belly dance intervention	74	BDI; PSS; LOT; FACT-F; PSQI; VAS; IPAQ	Belly dance improved body image short- and long-term; Pilates improved long-term
Brazil (2023)	Bertoli et al.	Effects of 24-week Mat Pilates on strength and flexibility	43	GEE; strength and flexibility tests	Improved upper and lower body strength and flexibility
Brazil (2022)	De Rezende et al.	Effects on functional capacity, pain, and quality of life	44	DASH; SPADI	61% improvement in scores; significant pain reduction
Brazil (2022)	Bertoli et al.	Influence of adherence to Mat Pilates	43	Strength and torque tests	Higher adherence associated with greater improvements
Brazil (2021)	Leite et al.	Effects on range of motion, self-esteem, and depression	52	Goniometer; Rosenberg Scale; BDI	Improved range of motion; greater gains with Pilates
Brazil (2021)	Carvalho et al.	Pilates vs. circuit exercise on arthralgia	60	VAS	Significant pain reduction in Pilates group
Brazil (2021)	Fretta et al.	Effects on postural alignment and balance	34	SAPO; Mini-BESTest	Improved postural alignment and balance
Brazil (2021)	Fretta et al.	Effects on self-esteem and depression	34	Self-Esteem Scale; BDI	Significant improvement in self-esteem
Brazil (2020)	Boing et al.	Comparison of Pilates and belly dance protocols	32	Multiple QoL instruments	Both improved physical and psychological quality of life
Ukraine (2019)	Odynets et al.	Exercise interventions and quality of	115	FACT-B	Aquatic exercise more effective for emotional

		life			well-being
Turkey (2017)	Zengin Alpozgen et al.	Pilates vs. combined and home exercise rehabilitation	55	VAS; Goniometer; Dynamometer; DASH	Similar improvements in pain, strength, and function
USA (2012)	Stan et al.	ROM, posture, quality of life, mood, and body image	10	Goniometer; FACT-B; POMS/HADS; BIS	Improvements in ROM, quality of life, mood, and body image
Italy (2010)	Eyigor et al.	Performance, fatigue, depression, and quality of life	52	6MWT; BFI; BDI; EORTC QLQ-C30/BR23	Improved functional capacity, fatigue, depression, and quality of life
Canada (2008)	Keays et al.	Effects on ROM, pain, mood, and upper limb function	4	ROM tests; VAS	Pilates safe and beneficial; improved ROM, pain, and function

Note. BDI = Beck Depression Inventory; BFI = Brief Fatigue Inventory; BIS = Body Image Scale; DASH = Disabilities of the Arm, Shoulder and Hand; EORTC QLQ-C30/BR23 = European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire; FACT-B = Functional Assessment of Cancer Therapy–Breast; FACT-F = Functional Assessment of Cancer Therapy–Fatigue; GEE = Generalized Estimating Equations; IPAQ = International Physical Activity Questionnaire; PSQI = Pittsburgh Sleep Quality Index; SAPO = Software for Postural Assessment; SF-36 = Short Form Health Survey; SPADI = Shoulder Pain and Disability Index; VAS = Visual Analog Scale; 6MWT = 6-Minute Walk Test.

Thematic analysis

1. Pilates and quality of life

Of the 16 studies analyzed, 12 directly addressed quality of life (QoL) as one of the main evaluated indicators, highlighting its relevance as a comprehensive construct of overall health, particularly in oncological survivorship contexts. QoL acquires special importance in the rehabilitation process of women diagnosed with breast cancer (BC), considering that the effects of the disease and its treatments go beyond the physical dimension, also impacting emotional, social, spiritual, and religious domains (Zengin Alpozgen et al., 2017). Although therapeutic advances have contributed to increased survival rates, the side effects of interventions such as mastectomy, chemotherapy, and radiotherapy significantly compromise QoL, interfering with both physical functioning and mental health (Bertoli et al., 2025). In this context, QoL emerges as a central indicator for assessing the effectiveness of complementary interventions, such as the Pilates method, in promoting the comprehensive recovery of these patients.

Several studies highlight the benefits of Pilates across multiple dimensions of QoL, including pain and fatigue reduction, improvement in functional capacity, and enhancement of emotional well-being. Zengin Alpozgen et al. (2017) emphasize that the positive effects of physical exercise in oncology patients can be considered not only “healthy” but also “therapeutic,” due to the mobilization of immunological mechanisms induced by physical exercise.

Bertoli et al. (2025), when evaluating the effects of Pilates in women undergoing hormonal therapy, found significant improvements in physical function and mental health, with reduced anxiety and increased self-esteem. The study used the EORTC QLQ-C30 instrument to measure QoL, and significant improvements were observed in the general health, physical function, and emotional function scales. Consistent results were reported by Rezende et al. (2022), who added that regular Pilates practice promotes functional improvement of the upper limb, as well as greater social interaction, which is a factor directly associated with improved QoL. Leite et al. (2024) corroborate these findings, demonstrating, through control groups, that complementary techniques such as relaxation and mindfulness also produce positive effects on QoL. Similarly, Carvalho et al. (2021) observed that Pilates was more effective than circuit training in reducing pain in women undergoing hormonal treatment, with pain being a critical determinant of QoL.

Fretta et al. (2021), when analyzing the effects of the method on postural alignment in women undergoing hormonal therapy, identified improvements in body awareness and balance, attributed to the method’s emphasis on the principles of centering and motor control. The authors highlight the strengthening of the “powerhouse” as a factor promoting postural stability and recommend the adoption of Pilates as a functional rehabilitation strategy for this population.

In addition to physical benefits, Pilates practice has proven effective in reducing anxiety, depression, and feelings of helplessness frequently experienced during the recovery phase (Leite et al., 2024). Studies

investigating combined approaches reinforce the integrative potential of the method. Boing et al. (2020) evaluated the association between Pilates and belly dancing, demonstrating psychological and physical benefits; Odyne et al. (2019) concluded that aquatic practice is particularly effective in improving emotional well-being; and Zengin et al. (2017) reported that Pilates, compared to combined and home-based exercises, promotes greater improvements in pain reduction, increased muscle strength, and enhanced functionality.

One of the pioneering studies in the field, conducted by Eyigor et al. (2010), indicated that although further research is needed, Pilates exercises have a positive impact on functional capacity, fatigue, depression, and, consequently, QoL in women with breast cancer, and should be considered as a complementary strategy in oncological rehabilitation.

2. Pilates and functional capacity

Of the 16 studies analyzed, four specifically addressed functional capacity, although this parameter is part of the broader concept of quality of life (QoL) in women with breast cancer (BC). Since these studies focused exclusively on this dimension, it was decided to analyze it separately from the other QoL domains.

Rehabilitation after BC has increasingly focused on non-pharmacological interventions, particularly physical exercise. Among these, the Pilates method has stood out as an effective approach, as it simultaneously promotes muscle strengthening, flexibility, and mental and emotional well-being—components often neglected in traditional rehabilitation programs (Leite et al., 2024; Boing et al., 2023).

One of the first identified studies on the Pilates method in women with BC was conducted in Canada (Keays et al., 2008) and aimed to evaluate the effects of the method on shoulder range of motion. The results demonstrated significant improvements in internal and external joint rotation, suggesting early benefits in post-treatment mobility.

More recent research reinforces these findings. Rezende et al. (2022) showed that Pilates programs contributed to significant improvements in shoulder range of motion and muscle strength levels in women who underwent surgery and radiotherapy—interventions that often compromise upper limb function. Similarly, Bertoli et al. (2025) observed that the method was effective in reducing pain and improving joint mobility, particularly in the scapulohumeral region, which is often affected by stiffness associated with radiotherapy. The emphasis of Pilates on centering, motor control, and breathing additionally contributes to postural correction and relief of muscle tension, such as cervical and dorsal pain, which are common in this group of patients (Stan et al., 2012).

Rezende et al. (2022) implemented a 12-week Pilates program focused on strengthening and stretching exercises targeting the trunk, shoulders, and upper limbs. Participants reported significant improvements in pain and in their ability to perform activities of daily living, such as raising their arms or carrying objects—functions that are often impaired after BC treatment.

3. Pilates and psychological well-being

Although psychological well-being is often considered a component of quality of life in research relating to breast cancer and Pilates practice, its importance justifies a separate analysis in this study.

In addition to physical benefits, several studies highlight the positive impact of Pilates on psychological well-being. Regular practice has been associated with reduced anxiety, increased self-esteem, and decreased depressive symptoms, which are often exacerbated by the physical and emotional consequences of oncological treatment (Han et al., 2024). Leite et al. (2024) found that women undergoing adjuvant hormonal therapy who practiced Pilates regularly showed significant improvements in emotional health and overall quality of life.

Psychological well-being plays a fundamental role in recovery and in the quality of life of cancer patients and is essential for coping with the emotional and mental challenges imposed by the disease and its treatments. In addition to the emotional effects of diagnosis and invasive treatments, many women face problems such as depression, anxiety, and a significant decrease in self-esteem (Rezende et al., 2022). One of the main characteristics of Pilates is its mind–body approach, which emphasizes the connection between physical movement and mental focus. Pilates practice requires the individual to be fully present in the moment, with attention focused on movement and breathing. This type of mindfulness can help reduce stress and anxiety levels, providing a sense of calm and balance (Leite et al., 2024). Studies demonstrate that regular Pilates practice can lead to a significant reduction in anxiety and depression symptoms, contributing to a more balanced and positive emotional state (Leite et al., 2021).

Pilates also helps improve patients' self-esteem and self-confidence, which is particularly important for those who have undergone aggressive oncological treatments, such as chemotherapy or mastectomy. The recovery of strength, flexibility, and mobility can provide a sense of achievement and well-being, helping patients feel more in control of their bodies and their health. Furthermore, improvements in posture and the sensation of physical strength can positively influence how patients perceive themselves, promoting greater self-confidence (Eyigor et al., 2010).

Another psychological benefit of Pilates is its ability to improve sleep quality, a common problem among cancer patients, especially those undergoing treatment. Pilates practice, with its focus on relaxation and

controlled breathing, can help relieve accumulated physical and mental tension, promoting deeper and more restorative rest. Quality sleep is essential for physical and emotional recovery, reducing stress and fatigue levels (Leite et al., 2021).

Additionally, Pilates practice provides opportunities for social interaction and support, especially when performed in group settings. This social aspect can be particularly valuable for patients who feel isolated or disconnected due to their diagnosis. Participating in Pilates sessions can create an emotional support network, positively impacting participants' psychological well-being (Stan et al., 2012).

The study by Fretta et al. (2021), which examined the effects of a 16-week Pilates intervention on self-esteem and depressive symptoms in women with breast cancer, concluded that the method was effective in improving these parameters, as measured by a Self-Esteem Questionnaire and the Beck Depression Inventory. Similarly, Leite et al. (2024) and Han et al. (2024) demonstrated that regular Pilates practice helps improve mood in women with breast cancer, reducing anxiety levels and promoting acceptance of their bodies after treatment. Participants who practiced Pilates reported a greater sense of emotional control and an improved perception of their physical and mental health.

Discussion

The results of this review indicate that the Pilates method plays a significant role in improving the quality of life (QoL) of women diagnosed with breast cancer (BC), in both physical and psychological contexts. Notably, 12 of the studies directly evaluated QoL as a central indicator, confirming that, beyond clinical survival, it is essential to consider the global dimension of health, including emotional, social, and even spiritual aspects (Stan et al., 2012). This focus is consistent with contemporary health perspectives, which value comprehensive recovery and the functional and social reintegration of patients. In this regard, the studies demonstrate consistent benefits of Pilates across several dimensions of QoL, including reductions in pain, fatigue, and stiffness, as well as improvements in functional capacity and emotional well-being. These findings corroborate the literature recognizing mind–body modalities, such as Pilates, as effective strategies not only for physical benefits but also for psychophysiological and immunological effects (e.g., Eyigor et al., 2010; Fretta et al., 2021; Torres et al., 2023).

In this sense, Pilates emerges as a promising strategy, especially during oncological rehabilitation phases, when the side effects of invasive treatments such as mastectomy, chemotherapy, and radiotherapy compromise physical function and mental health (Bertoli et al., 2025).

Regarding functional capacity, several studies reported improvements in shoulder range of motion, muscle strengthening, and postural correction (Rezende et al., 2022; Bertoli et al., 2025). These gains are particularly relevant for recovering functions compromised by treatment, especially in the shoulder girdle, which is frequently affected by radiotherapy. The emphasis on the principles of centering and motor control promotes physical stability and body awareness, which are crucial aspects for restoring self-confidence and a positive body image. From a psychological perspective, the data consistently indicate that Pilates contributes to reducing anxiety, depression, and feelings of helplessness, while also promoting self-esteem (Bertoli et al., 2025; Leite et al., 2024). Regular practice, by integrating conscious breathing, fluid movements, and mental focus, acts as a facilitator of mindfulness, helping patients manage stress and rebuild a healthier relationship with their body and mind. This effect is reinforced by mind–body–based programs such as Pilates and mindfulness, which promote more balanced emotional recovery (Fretta et al., 2021).

Another relevant aspect is the social dimension of practice. When performed in group settings, Pilates encourages social interaction and creates spaces for emotional support, reducing the sense of isolation commonly experienced by oncology patients. This social dimension may function as a mediating factor in improving QoL, as highlighted by Rezende et al. (2022).

Despite the positive evidence, important gaps remain. Some studies, such as Boing et al. (2020), highlight the need for long-term research with robust methodologies and larger samples to confirm the durability of the observed effects. Furthermore, there is no consensus regarding the ideal frequency and intensity of Pilates programs to optimize functional and emotional rehabilitation in BC survivors, which constitutes a priority for future research. Recent Brazilian studies demonstrate a strong trend toward multimodal and individualized interventions, reflecting an integrated approach that considers both the physical and emotional health of patients. However, there is still a need for standardized protocols, larger sample sizes, and long-term follow-up to consolidate evidence and provide robust clinical recommendations. Pilates therefore represents a promising and comprehensive approach in oncological rehabilitation, contributing to the physical and emotional recovery of patients facing the challenges of post-breast cancer treatment.

Limitations

Although the results of this thematic analysis consistently point to the benefits of Pilates in improving QoL and functional capacity in women with BC, some limitations must be acknowledged. First, most studies had small sample sizes, which limits the generalizability of the findings to broader populations. In addition, there is significant methodological heterogeneity among the studies, both in terms of the duration and frequency of

Pilates programs and in the use of QoL assessment instruments (for example, EORTC QLQ-C30 and other complementary questionnaires), which makes direct comparison of results difficult.

Another point to highlight is the lack of longitudinal studies evaluating the sustained effects of Pilates practice in the medium and long term after the interventions have ended. Most studies focus on relatively short intervention periods, ranging between 8 and 16 weeks, which does not allow for a clear understanding of whether the observed benefits are maintained over time. Additionally, few studies consider sociodemographic variables, such as age, pre-diagnosis physical activity level, and social support, factors that may directly influence outcomes.

Furthermore, no studies were identified that specifically explored the benefits of machine-based Pilates (such as Reformer, Cadillac, and Chair) in the recovery of women with BC, which highlights an opportunity for new research in this area to further explore the therapeutic potential of this modality of the method.

Despite the encouraging results, it is necessary to recognize the methodological limitations observed in the analyzed studies, such as small sample sizes and short intervention periods. These factors reinforce the need for more longitudinal research and high-quality randomized clinical trials to consolidate the scientific evidence regarding the effects of Pilates in this population. Finally, the scarcity of high-quality randomized controlled trials (RCTs) limits the robustness of the evidence. Although some studies included control groups (Leite et al., 2024), there is still a need for greater standardization in experimental design and exercise protocol selection to ensure the external validity of the findings.

Conclusion

This systematic review provides an updated synthesis of the available evidence on the role of Pilates in the rehabilitation of women with breast cancer (BC). Overall, the findings suggest that Pilates is a promising complementary exercise approach with potential benefits across three interrelated dimensions: quality of life (QoL), functional capacity, and psychological well-being. Across the studies reviewed, Pilates was associated with improvements in several outcomes relevant to breast cancer recovery, including pain, fatigue, muscular strength, flexibility, mobility, postural alignment, balance, self-esteem, mood, anxiety, and depressive symptoms. These findings are particularly relevant because the consequences of BC and its treatments extend beyond disease control and may persistently affect physical function, emotional health, autonomy, and participation in daily life.

From a functional perspective, the available evidence suggests that Pilates may contribute to improvements in upper-limb and shoulder mobility, muscular strength, flexibility, postural control, and the performance of activities of daily living. These outcomes are particularly relevant for women experiencing functional limitations following surgery, radiotherapy, or systemic treatment. From a psychological perspective, the integration of controlled movement, breathing, concentration, and body awareness may provide additional benefits by supporting self-esteem, body image, emotional well-being, and a greater sense of control during the recovery process. Therefore, one of the main contributions of Pilates may lie in its multidimensional nature, addressing physical and psychosocial aspects of rehabilitation within the same exercise modality.

The main contribution of this review is the integration of these outcomes into a broader understanding of Pilates within breast cancer rehabilitation. Rather than considering isolated physical or psychological outcomes, the findings indicate that quality of life, functional capacity, and psychological well-being are closely interconnected dimensions of recovery. This perspective reinforces the importance of approaching oncological rehabilitation comprehensively and suggests that Pilates may have value as a complementary component of multidisciplinary rehabilitation programs. In practical terms, the findings may help health, rehabilitation, and exercise professionals better understand which outcomes may potentially benefit from Pilates and support the development of individualized, supervised exercise strategies adapted to the functional capacity, treatment stage, and specific needs of women with BC.

However, these findings should be interpreted with caution. The current evidence base is characterized by small sample sizes, considerable methodological heterogeneity, differences in intervention duration and frequency, variation in outcome assessment instruments, limited long-term follow-up, and a scarcity of high-quality randomized controlled trials. Consequently, the available evidence is not yet sufficient to establish a standardized Pilates protocol or to determine the optimal frequency, intensity, duration, and type of Pilates intervention for women with BC. Furthermore, the predominance of Mat Pilates in the existing literature limits conclusions regarding the potential benefits of apparatus-based Pilates, including the Reformer, Cadillac, and Chair. Future research should therefore prioritize adequately powered randomized controlled trials, standardized intervention protocols and outcome measures, and longer follow-up periods to determine whether the observed benefits are sustained over time. Studies should also examine how individual and clinical characteristics, including age, previous physical activity levels, treatment type, stage of recovery, and social support, may influence responses to Pilates interventions. Particular attention should be given to comparing different Pilates modalities and determining whether apparatus-based Pilates provides additional or distinct benefits compared with Mat Pilates. These advances would contribute to establishing clearer evidence-based recommendations and facilitate the translation of research findings into clinical and exercise practice.

In conclusion, Pilates represents a potentially valuable complementary strategy for the rehabilitation of women with breast cancer, particularly because of its capacity to integrate physical exercise with body awareness, breathing, motor control, and mental focus. The evidence synthesized in this review supports its potential contribution to physical, functional, and psychological recovery, while also demonstrating that stronger and more standardized evidence is required before definitive clinical recommendations can be established. By identifying both the potential benefits and the remaining gaps in knowledge, this review provides a foundation for future research and for the progressive development of evidence-based Pilates interventions within comprehensive oncological rehabilitation.

Declaration on the Use of Artificial Intelligence

Generative Artificial Intelligence (ChatGPT, OpenAI) was used exclusively to assist with the organization and formatting of the bibliographic references included in this article. All references were subsequently reviewed and verified by the author, who assumes full responsibility for their accuracy and appropriateness.

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