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EFFECTIVENESS OF PILATES IN THE MANAGEMENT OF CHRONIC NON-SPECIFIC LOW BACK PAIN: A NARRATIVE LITERATURE REVIEW

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ABSTRACT

This narrative review aimed to evaluate the effectiveness of Pilates in reducing pain and functional disability in adults with chronic non-specific low back pain, with additional consideration of quality of life, psychological outcomes, comparisons with other exercise modalities, and factors influencing treatment effectiveness. A literature search was conducted between May and June 2026 using PubMed, Scopus, and Embase, and reference lists of relevant systematic reviews and meta-analyses were also screened. Randomized controlled trials, prospective clinical studies, systematic reviews, meta-analyses, network meta-analyses, clinical practice guidelines, and state-of-the-art reviews were considered, with 24 publications included in the final narrative synthesis. Current evidence indicates that Pilates reduces pain intensity and functional disability and may improve health-related quality of life and selected psychological outcomes, including fear of movement and sleep-related measures. Pilates generally provides greater benefits than no intervention, minimal intervention, or non-specific exercise; however, its superiority over other structured exercise programmes is not consistently demonstrated. Treatment outcomes appear to be influenced by exercise dose, supervision, individualization, programme quality, and adherence, while heterogeneity in intervention protocols, participant characteristics, outcome measures, and follow-up duration limits direct comparisons across studies. Overall, Pilates represents an effective evidence-based exercise option for chronic non-specific low back pain and may be incorporated into individualized rehabilitation according to patients' functional limitations, preferences, and therapeutic goals. Further high-quality randomized controlled trials with standardized protocols and longer follow-up periods are needed.

KEYWORDS

Pilates, Chronic Non-specific Low Back Pain, Exercise Therapy, Rehabilitation, Pain, Functional Disability

CITATION

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1. Introduction

Low back pain (LBP) is one of the most prevalent musculoskeletal disorders worldwide and the leading cause of years lived with disability (YLDs). According to the Global Burden of Disease Study 2021, approximately 619 million people were affected by LBP in 2020, and this number is projected to increase to nearly 843 million by 2050 due to population ageing and demographic growth [1]. LBP substantially reduces quality of life, limits daily functioning, decreases work productivity, and imposes a considerable socioeconomic burden. Chronic primary low back pain accounts for the vast majority of chronic LBP presentations in primary care and is commonly estimated to represent at least 90% of cases [2].

Current management of chronic non-specific low back pain emphasizes conservative, patient-centred treatment based on the biopsychosocial model. The World Health Organization recommends structured exercise programmes as part of the non-surgical management of chronic primary low back pain. Various exercise modalities, including strengthening, motor control, mind-body and other structured exercise programmes, may be considered according to the patient's clinical presentation, preferences, and functional goals [2].

Among the available exercise-based interventions, Pilates is one of the best-known mind-body exercise methods [3]. Mind-body exercise programmes have gained increasing attention because they combine physical training with movement control, breathing, and postural awareness [4–6]. Pilates focuses on controlled movement, core stability, breathing, flexibility, postural alignment, concentration, and coordinated activation of deep trunk muscles. In recent years, Pilates has become increasingly incorporated into rehabilitation programmes for patients with chronic non-specific low back pain. Numerous randomized controlled trials, systematic reviews, and meta-analyses have investigated its effectiveness. Current evidence suggests that Pilates reduces pain intensity, improves functional disability, enhances quality of life, and positively affects trunk muscle function. Several systematic reviews have also reported that Pilates is at least as effective as many other exercise-based rehabilitation programmes [4,7,8].

Despite these encouraging findings, several important questions remain unanswered. It is still unclear whether Pilates is superior to other exercise modalities, which type of Pilates programme provides the greatest benefit, and which patients respond best to this intervention. Recent network meta-analyses indicate that although exercise therapy is effective for chronic low back pain, no single exercise modality consistently demonstrates superior outcomes across all patient populations [4–6,9].

Therefore, the aim of this narrative review was to evaluate the current evidence regarding the effectiveness of Pilates in reducing pain and disability in individuals with chronic non-specific low back pain, with particular emphasis on functional outcomes, quality of life, comparisons with other exercise modalities, and factors influencing treatment effectiveness.

2. Materials and methods

This study was conducted as a narrative review evaluating the effectiveness of Pilates in the management of chronic non-specific low back pain. A literature search was performed between May and June 2026 using PubMed, Scopus, and Embase, supplemented by manual screening of reference lists from relevant systematic reviews and meta-analyses. Search terms included “Pilates”, “clinical Pilates”, “chronic low back pain”, “chronic non-specific low back pain”, “exercise therapy”, “rehabilitation”, “pain”, “functional disability”, and “quality of life”, combined using Boolean operators where appropriate. Randomized controlled trials, prospective clinical studies, systematic reviews, meta-analyses, network meta-analyses, clinical practice guidelines, and state-of-the-art reviews were considered. Studies concerning acute or specific low back pain, case reports, protocols, conference abstracts, editorials, and publications without sufficient methodological information were excluded. The main synthesis focused on chronic non-specific low back pain, while selected studies involving broader chronic musculoskeletal pain or subacute low back pain were included only when relevant to psychological outcomes or prevention of chronicity. Only full-text English-language publications were considered. Overall, 24 publications were included and synthesized qualitatively according to the main outcomes of pain, disability, quality of life, comparisons with other exercise modalities, and factors influencing treatment effectiveness.

3. Results

3.1. Effect of Pilates on Pain Reduction

Pain reduction is the most consistently reported benefit of Pilates in individuals with chronic non-specific low back pain. Current evidence from systematic reviews, meta-analyses, network meta-analyses, and randomized controlled trials consistently indicates that Pilates is an effective non-pharmacological intervention for reducing pain intensity compared with no intervention and many conventional exercise programmes [4,7,12].

The strongest evidence comes from recent systematic reviews and meta-analyses. Patti et al. included 36 randomized controlled trials, of which 19 were eligible for quantitative synthesis, and demonstrated that Pilates significantly reduced pain compared with both no exercise and non-specific exercise [7]. Similarly, Yu et al. analyzed 19 randomized controlled trials involving 1,108 participants and reported a significant reduction in pain intensity in favor of Pilates (SMD = -1.31; 95% CI -1.80 to -0.83; $p < 0.00001$), supporting Pilates as an effective conservative treatment for chronic low back pain [12].

Wong et al. reported that Pilates was more effective than general exercise for pain reduction, although the certainty of evidence was limited. Comparisons with other structured exercise modalities, including spinal stabilization and direction-specific exercise, showed less consistent differences [8]. Comparable outcomes were also found between Pilates and spinal stabilization exercises for both pain and disability [8]. Overall, the available evidence does not support the universal superiority of one exercise modality, and exercise selection should be individualized according to patients' clinical presentation, goals, and preferences [7,8].

Recent network meta-analyses have further strengthened the evidence supporting Pilates. Tian et al. demonstrated that Pilates achieved the greatest reduction in pain among the evaluated mind-body exercise modalities, exceeding the predefined minimal clinically important difference and obtaining the highest SUCRA ranking for pain reduction [4]. Similarly, Liang et al. reported that treatment effectiveness depends on both exercise modality and total exercise dose, with a nonlinear dose–response relationship emphasizing the importance of adequately prescribed and structured exercise programmes [5].

Evidence from randomized controlled trials is consistent with these findings. Tottoli et al. demonstrated that a six-week supervised Pilates programme resulted in significantly lower pain intensity immediately after treatment than home-based exercise, although these between-group differences were no longer statistically significant at the six-month follow-up [10]. Furthermore, Kwok et al. showed that individualized DMA Clinical Pilates™ produced clinically meaningful reductions in pain together with superior improvements in physical function compared with both general Pilates and conventional exercise programmes [11].

Overall, the current body of evidence consistently supports Pilates as an effective exercise-based intervention for reducing pain in adults with chronic non-specific low back pain. The greatest benefits are observed in the short term, whereas long-term superiority over other structured exercise programmes has not been consistently demonstrated.

3.2. Effect of Pilates on Functional Disability

Functional disability is one of the most frequently evaluated outcomes in studies investigating the effectiveness of Pilates for chronic non-specific low back pain. Current evidence indicates that Pilates improves functional capacity and reduces disability, as assessed using validated instruments such as the Oswestry Disability Index (ODI) and the Roland Morris Disability Questionnaire (RMDQ), supporting its role as an effective conservative intervention for individuals with chronic low back pain [7,8,12].

The strongest evidence comes from recent systematic reviews and meta-analyses. Patti et al. concluded that Pilates significantly improves functional disability compared with both no exercise and non-specific exercise, demonstrating consistent benefits across randomized controlled trials included in the meta-analysis [7]. Similarly, Yu et al. reported significant improvements in disability, with pooled analyses showing favorable effects for both the Oswestry Disability Index (MD = -4.35) and the Roland Morris Disability Questionnaire (MD = -2.26), indicating statistically significant improvements in functional disability following Pilates interventions [12].

When Pilates was compared with other exercise modalities, improvements in disability remained evident; however, the superiority of Pilates was less consistent. Wong et al. found that Pilates produced outcomes comparable to spinal stabilization exercises and direction-specific exercise programmes, suggesting that several well-designed exercise approaches may provide similar improvements in functional disability [8]. Consequently, current evidence supports exercise therapy itself rather than identifying a single exercise modality as universally superior [8].

Network meta-analyses provide additional support for these findings. Tian et al. demonstrated that Pilates ranked among the most effective mind-body exercise modalities for improving clinical outcomes in individuals with low back pain [4]. Similarly, Liang et al. demonstrated that exercise outcomes are influenced by exercise modality and total exercise dose, with a nonlinear dose-response relationship [5].

Evidence from randomized controlled trials is consistent with the conclusions of recent meta-analyses. Tottoli et al. demonstrated that participants receiving supervised Pilates achieved greater reductions in disability immediately after treatment than those performing home-based exercises, although these between-group differences diminished during long-term follow-up [10]. Likewise, Kwok et al. reported greater improvements in disability and physical function following individualized Clinical Pilates than after general Pilates or conventional exercise programmes [11].

Recent evidence also indicates that combining Pilates with complementary rehabilitation techniques may further improve functional outcomes. Ha et al. demonstrated that both Reformer Pilates alone and Reformer Pilates combined with self-myofascial release significantly reduced disability measured with the Korean Oswestry Disability Index [13]. Although both interventions were effective, the combined programme produced greater improvements in muscle stiffness and muscle function, suggesting that adjunctive soft-tissue interventions may enhance the functional benefits of Pilates-based rehabilitation [13].

Overall, current evidence consistently supports Pilates as an effective intervention for reducing functional disability in individuals with chronic non-specific low back pain. Improvements are consistently observed across different disability assessment tools and are confirmed by systematic reviews, network meta-analyses, and randomized controlled trials. Nevertheless, available evidence suggests that Pilates should be considered one of several evidence-based exercise interventions, with treatment selection tailored to the patient's clinical presentation, functional limitations, and rehabilitation goals [4,7,8,12].

3.3. Effect of Pilates on Quality of Life and Psychological Outcomes

Beyond reducing pain and disability, Pilates appears to provide broader benefits by improving health-related quality of life and several psychological outcomes in individuals with chronic low back pain. Recent evidence suggests that these benefits extend to domains such as fear of movement, fatigue, sleep quality, pain coping strategies, and psychological well-being, supporting the biopsychosocial role of Pilates in rehabilitation [12,14].

Systematic review evidence indicates that Pilates can improve health-related quality of life; however, the magnitude of improvement is less consistent than that observed for pain or disability. Yu et al. reported favorable effects across several included randomized controlled trials, although pooled analyses demonstrated greater consistency for pain reduction and functional improvement than for quality-of-life outcomes [12].

Recent randomized controlled trials have provided further evidence that Pilates positively influences both physical and psychological health. Ha et al. demonstrated that Reformer Pilates significantly improved quality of life in women with chronic low back pain, while the addition of self-myofascial release resulted in further improvements in muscle function and tissue properties [13].

Psychological outcomes have been investigated in greater detail by Şahan et al., who demonstrated that a six-week Reformer Pilates programme significantly improved fear of movement, fatigue, sleep quality, active pain coping strategies, and psychological pain beliefs, in a population of women with chronic musculoskeletal pain including low back and neck pain, compared with the control group. Significant improvements were also observed in pain-related interference with daily activities, mood, walking ability, work performance, interpersonal relationships, sleep, and enjoyment of life, suggesting that Pilates positively influences multiple dimensions of patient functioning beyond pain reduction alone [14].

Similar findings regarding fear of movement were reported by Cruz-Díaz et al., who observed that a 12-week Pilates programme significantly reduced kinesiophobia together with improvements in pain and disability. The greatest improvements in disability and kinesiophobia occurred during the first six weeks of intervention and were maintained throughout the twelve-week programme, indicating that Pilates may facilitate both physical recovery and increased confidence in movement [15].

Overall, the available evidence suggests that the benefits of Pilates extend beyond musculoskeletal outcomes. In addition to reducing pain and improving physical function, Pilates may enhance health-related quality of life, reduce fear of movement, improve sleep quality, decrease fatigue, and promote more adaptive psychological responses to chronic pain. These multidimensional effects support the inclusion of Pilates within a biopsychosocial rehabilitation approach for individuals with chronic low back pain [12,14,15].

3.4. Comparison of Pilates with Other Exercise Modalities

Although substantial evidence supports the effectiveness of Pilates in managing chronic non-specific low back pain, its superiority over other structured exercise interventions remains uncertain. Most systematic reviews conclude that Pilates is more effective than minimal intervention or no exercise; however, differences become less pronounced when it is compared with other evidence-based exercise programmes, such as spinal stabilization, motor control exercises, or direction-specific exercise [8].

Wong et al. found low-certainty evidence that Pilates was more effective than general exercise for pain reduction and very-low-certainty evidence favoring Pilates over direction-specific exercise for pain. Pilates and spinal stabilization exercise showed comparable effects on pain and disability. Overall, the evidence did not support the clear superiority of one exercise modality over another [8].

Similar conclusions were reached by Patti et al., who demonstrated that Pilates consistently outperformed no intervention and non-specific exercise but did not consistently exceed the effectiveness of other structured therapeutic exercise programmes [7]. Likewise, Yu et al. observed significant improvements in pain and disability following Pilates interventions but noted that differences between various active exercise programmes were generally small [12].

Network meta-analyses provide additional insight into these comparisons. Tian et al. ranked Pilates as the most effective mind-body exercise modality for reducing pain in individuals with chronic low back pain, suggesting a potential advantage over yoga, Tai Chi, and Qigong for short-term symptom relief [4]. These findings are consistent with the broader network meta-analysis by Owen et al., which compared multiple exercise interventions for low back pain and demonstrated that several structured exercise modalities provide clinically meaningful benefits. The authors concluded that no single exercise approach was consistently superior across all outcomes, highlighting the importance of individualized exercise prescription [9]. However, Liang et al. demonstrated that treatment outcomes were influenced not only by exercise modality but also by

programme duration, weekly training frequency, and overall exercise dose, indicating that exercise prescription may be as important as exercise type itself [5].

Evidence from recent randomized controlled trials supports these observations. Kwok et al. found that individualized DMA Clinical Pilates™ produced greater improvements than both general Pilates and conventional exercise, suggesting that individualized assessment and exercise selection may enhance clinical outcomes [11]. In contrast, Tottoli et al. reported only short-term superiority of supervised Pilates over home-based exercise, with between-group differences diminishing during long-term follow-up [10].

Overall, current evidence suggests that Pilates should be regarded as one of several evidence-based exercise interventions for chronic non-specific low back pain. Rather than identifying a universally superior exercise modality, recent literature emphasizes individualized rehabilitation programmes that consider patient characteristics, functional impairments, preferences, and adherence to exercise.

3.5. Factors Influencing the Effectiveness of Pilates

Current evidence suggests that the effectiveness of Pilates depends not only on the exercise method itself but also on several programme-related factors, including exercise dose, intervention duration, supervision, individualization of treatment, and the use of complementary therapeutic techniques [5].

Liang et al. demonstrated that exercise effectiveness is influenced by exercise dose, with a nonlinear dose-response relationship between exercise volume and pain reduction [5]. Available evidence suggests that Pilates sessions should be supervised, last approximately 60 minutes, and be performed two to three times per week, although the optimal overall programme duration remains uncertain [16].

The degree of individualization may also influence treatment outcomes. Kwok et al. demonstrated that DMA Clinical Pilates™, which incorporates individualized movement assessment and targeted exercise prescription, produced greater improvements in pain, disability, movement quality, flexibility, and biomechanical performance than both general Pilates and conventional exercise programmes [11].

Supervision represents another important factor. Tottoli et al. reported that participants performing supervised Pilates achieved greater short-term improvements than those completing home-based exercise programmes independently, suggesting that therapist guidance may improve exercise quality, adherence, and early clinical outcomes [10].

Recent studies also indicate that combining Pilates with complementary interventions may further enhance rehabilitation outcomes. Ha et al. observed that adding self-myofascial release to a Reformer Pilates programme resulted in greater improvements in muscle stiffness and muscle function while maintaining significant improvements in disability and quality of life, suggesting that multimodal exercise programmes may provide additional benefits for selected patients [13].

Another programme-related factor that may influence treatment outcomes is the execution technique used during Pilates exercises. Lunkes et al. demonstrated that participants instructed to perform Pilates while keeping the abdominal muscles relaxed achieved slightly greater improvements in disability than those instructed to maintain continuous abdominal contraction after a 12-week supervised programme. In contrast, no significant between-group differences were observed for pain intensity, patient-specific function, or global perceived improvement. These findings suggest that rigid core bracing may not be necessary to achieve clinical benefits and support a more flexible, patient-centred approach focused on movement quality rather than constant abdominal activation [19].

Exercise intensity also appears to have limited influence on the effectiveness of Pilates in chronic non-specific low back pain. In a large randomized controlled trial involving 168 participants, Coelho et al. compared high-intensity and low-intensity Pilates programmes and found no clinically meaningful differences in pain reduction, disability, patient-specific function, kinesiophobia, or hip muscle strength. Importantly, the low-intensity programme was associated with fewer adverse events, suggesting that lower exercise intensity may provide comparable clinical benefits while improving treatment tolerability and adherence [22].

Although different Pilates approaches, including mat-based, Reformer, and Clinical Pilates programmes, have all demonstrated beneficial effects, current evidence does not support the superiority of one specific Pilates format. Instead, programme quality, progression, supervision, and appropriate individualization appear to play a greater role in determining treatment effectiveness than the specific equipment or exercise variation used [4,7].

Recent evidence further supports the comparable effectiveness of Pilates and other structured exercise approaches. Zygouna et al. compared home-based, video-supported Pilates and McKenzie exercise programmes in adults with chronic non-specific low back pain. After a three-week intervention, both groups

demonstrated significant improvements in pain intensity, disability, pressure pain threshold, and lumbar flexibility, with no statistically significant between-group differences. These findings suggest that both Pilates and McKenzie exercises may represent effective, low-cost home-based rehabilitation options, while the choice between them can be guided by individual patient characteristics, preferences, and accessibility [20].

Recent evidence has also compared Pilates with proprioceptive neuromuscular facilitation (PNF), another commonly used rehabilitation approach for chronic low back pain. Ulusoy and Iyigun reported that both interventions produced comparable improvements in pain intensity, fear-avoidance beliefs, body image, and balance after four weeks of supervised treatment. However, Pilates demonstrated significantly greater improvements in core stability, suggesting that although both approaches are clinically effective, Pilates may provide additional benefits by enhancing trunk stabilization and movement control [23].

Overall, available evidence indicates that successful Pilates-based rehabilitation requires an individualized, progressive, and adequately supervised exercise programme. Optimizing exercise dose and tailoring interventions to patients' functional deficits may maximize clinical outcomes and improve long-term adherence to rehabilitation.

4. Discussion

4.1. Main findings

The present narrative review summarizes the current evidence regarding the effectiveness of Pilates in the conservative management of chronic non-specific low back pain. Overall, the available literature generally supports the effectiveness of Pilates in reducing pain intensity and functional disability and improving several aspects of health-related quality of life. These findings were consistently observed across systematic reviews, network meta-analyses, and randomized controlled trials, despite differences in study populations, intervention protocols, and outcome measures [4,7,12].

One of the most important findings of this review is that the beneficial effects of Pilates extend beyond pain reduction alone. These observations are consistent with previous systematic reviews of mind-body exercise interventions, which suggest that therapies integrating controlled movement, breathing, postural awareness, and motor control may provide multidimensional benefits for individuals with chronic low back pain [6]. Improvements were consistently reported in functional disability, movement confidence, sleep quality, fatigue, and psychological well-being, supporting the multidimensional role of Pilates within the biopsychosocial model of chronic pain rehabilitation [14,15].

Another important observation is that Pilates should not be interpreted as a universally superior exercise modality. This conclusion is supported by the network meta-analysis conducted by Owen et al., which demonstrated that although structured exercise is effective for chronic low back pain, no single exercise modality consistently outperformed all others across different clinical outcomes [9]. Although several studies demonstrated advantages over minimal intervention, home-based exercise, or non-specific exercise programmes, comparisons with structured rehabilitation approaches such as spinal stabilization or motor control exercises generally revealed comparable clinical outcomes [8,9].

The present findings also suggest that treatment success depends not only on the choice of exercise modality but also on programme quality. The characteristics of the Pilates method may partially explain these findings. Pilates emphasizes coordinated activation of the deep trunk muscles, including the transversus abdominis, multifidus, diaphragm, and pelvic floor muscles, while integrating postural alignment, controlled breathing, movement precision, and body awareness. These principles are believed to improve lumbopelvic stability, motor control, and movement quality, thereby contributing to pain reduction and functional improvement [16].

These principles are consistent with the original concept of the Pilates method, which integrates core stabilization, breathing control, postural alignment, movement precision, concentration, and coordinated activation of the deep trunk muscles [3]. Furthermore, systematic review evidence suggests that mind-body exercise interventions, including Pilates, may improve pain and disability by combining physical training with enhanced body awareness, motor control, and coordinated movement patterns [6].

Individualized exercise prescription, appropriate supervision, and adequate intervention duration appear to influence clinical outcomes to a greater extent than the specific Pilates format itself [5,11].

4.2. Clinical Implications

The findings of the present review are consistent with current international recommendations for the conservative management of chronic non-specific low back pain. The World Health Organization (WHO) recommends structured exercise programmes as one of the key non-surgical interventions for adults with chronic primary low back pain, emphasizing individualized, patient-centred management aimed at improving pain, physical function, and quality of life [2].

Similarly, the Journal of Orthopaedic & Sports Physical Therapy Clinical Practice Guideline recommends exercise therapy as a core component of rehabilitation for individuals with chronic low back pain. The guideline highlights that clinicians should prescribe individualized exercise programmes while considering patient preferences, functional limitations, psychosocial factors, and long-term adherence rather than focusing on a single exercise modality [17].

The evidence synthesized in this review supports these recommendations. Across systematic reviews, network meta-analyses, and randomized controlled trials, Pilates consistently demonstrated beneficial effects on pain intensity, functional disability, and selected aspects of health-related quality of life [4,7,12].

However, the available evidence also indicates that Pilates should not be regarded as a universally superior intervention. Instead, it should be considered one of several evidence-based exercise approaches that may be incorporated into individualized rehabilitation programmes. Comparative studies have shown that while Pilates frequently produces greater improvements than minimal intervention or non-specific exercise, its effectiveness is generally comparable with other structured exercise programmes, including spinal stabilization and motor control exercises [8,9]. This conclusion is further supported by a recent randomized controlled trial comparing video-supported home-based Pilates and McKenzie programmes. Both interventions produced clinically meaningful improvements in pain and physical function without significant between-group differences, suggesting that either approach may be successfully implemented in remote rehabilitation settings when supervised physiotherapy is not readily available [20].

Another important clinical consideration is patient selection. Although individualized exercise programmes are generally recommended, current evidence suggests that predicting which patients will benefit most from Pilates remains difficult. Amaral et al. found that neither a treatment-based classification system nor a Pilates-specific clinical prediction rule was able to identify subgroups of patients with chronic low back pain who achieved greater benefits from Pilates compared with an educational booklet. These findings indicate that, despite the importance of individualized rehabilitation, current subgroup classification tools have limited value in guiding the selection of patients for Pilates-based interventions [24].

From a clinical perspective, the present findings suggest that successful rehabilitation depends not only on the choice of exercise modality but also on appropriate programme design. The available evidence also suggests that treatment dose should be considered when designing Pilates programmes. However, despite evidence supporting twice-weekly supervised sessions, optimal exercise frequency and long-term dose-response relationships remain insufficiently established [18].

Evidence from a large randomized controlled trial suggests that the frequency of Pilates sessions may influence treatment outcomes. Although all Pilates groups achieved greater improvements than advice alone, programmes performed twice weekly produced the greatest short-term improvements in pain and disability, whereas increasing the frequency to three sessions per week did not result in additional clinically meaningful benefits [18]. Current evidence also indicates that Pilates programmes should be individualized and supervised by qualified instructors. Based on available evidence, interventions lasting approximately 60 minutes per session and performed two to three times per week appear to provide the most consistent clinical benefits for individuals with chronic non-specific low back pain [16]. Individualized assessment, adequate supervision, sufficient intervention duration, and progressive exercise prescription appear to be key determinants of treatment success. Therefore, Pilates may represent a valuable component of multidisciplinary rehabilitation programmes, particularly for patients who prefer supervised, movement-based exercise focused on postural control, trunk stability, and body awareness [5,11]. These findings are further supported by evidence indicating that mind-body exercise approaches delivered within physiotherapy practice contribute to improvements in pain and disability in patients with chronic low back pain [6].

4.3. Limitations of Current Evidence and the Present Review

Although the current body of evidence consistently supports the effectiveness of Pilates for individuals with chronic non-specific low back pain, several limitations should be considered when interpreting the available findings. One of the most important challenges is the substantial heterogeneity among the included studies. Considerable differences exist in participant characteristics, intervention protocols, programme duration, exercise frequency, supervision, and outcome measures, making direct comparisons between studies difficult [7,12].

Another important limitation is the lack of standardization of Pilates interventions. This issue has also been emphasized in previous reviews, which reported considerable variability in programme duration, exercise frequency, supervision, and the use of mat-based versus equipment-based Pilates, making direct comparisons between studies challenging [16]. The included studies investigated a wide variety of programmes, including mat-based Pilates, Reformer Pilates, Clinical Pilates, and individualized protocols. In several studies, Pilates was also combined with additional therapeutic approaches, such as self-myofascial release or other rehabilitation techniques, making it difficult to determine which intervention components were primarily responsible for the observed clinical improvements [11,13].

The duration of follow-up also represents an important limitation. Most randomized controlled trials evaluated outcomes immediately after interventions lasting between six and twelve weeks, whereas relatively few studies assessed the long-term maintenance of treatment effects. Consequently, although short-term improvements in pain and functional disability are consistently reported, evidence regarding the long-term sustainability of these benefits remains limited [7,10].

Another source of variability arises from differences in outcome assessment. Although pain intensity and disability were commonly evaluated using validated instruments such as the Visual Analogue Scale (VAS), Numeric Pain Rating Scale (NPRS), Oswestry Disability Index (ODI), and Roland Morris Disability Questionnaire (RMDQ), quality of life, psychological outcomes, and physical performance were measured using a wide range of assessment tools. This methodological diversity complicates quantitative comparisons across studies and contributes to statistical heterogeneity reported in several meta-analyses [8,12].

Finally, although recent network meta-analyses provide valuable comparative evidence, the available literature does not support the superiority of a single exercise modality for all patients with chronic non-specific low back pain. Instead, current evidence suggests that treatment outcomes are influenced by multiple factors, including exercise dose, programme quality, patient adherence, and appropriate individualization of rehabilitation. Future high-quality randomized controlled trials using standardized intervention protocols and longer follow-up periods are therefore required to determine the optimal implementation of Pilates in clinical practice [4,5].

Although the present review focused on chronic low back pain, recent evidence indicates that introducing Pilates during the subacute stage may reduce the risk of progression to chronic symptoms. Therefore, Pilates may have an important role not only in the treatment of established chronic low back pain but also as an early intervention strategy aimed at preventing chronicity [21].

Several limitations of the present review should be acknowledged. As a narrative review, it did not follow a formal systematic review protocol or include a standardized assessment of risk of bias and certainty of evidence. Therefore, study selection and interpretation may have been influenced by selection bias. In addition, only English-language publications were included, and heterogeneity in Pilates protocols, outcome measures, and follow-up periods limits direct comparisons between studies.

5. Conclusions

Current evidence supports Pilates as an effective conservative intervention for the management of chronic non-specific low back pain. The available literature consistently demonstrates that Pilates reduces pain intensity, improves functional disability, and contributes to better health-related quality of life. In addition, recent studies suggest that Pilates may positively influence psychological outcomes, including fear of movement, sleep quality, and overall well-being, supporting its role within a biopsychosocial approach to rehabilitation.

The findings of this review indicate that Pilates should be considered one of several evidence-based exercise interventions for individuals with chronic non-specific low back pain. Although current evidence does not consistently demonstrate its superiority over other structured exercise programmes, Pilates represents an effective rehabilitation option that should be individualized according to patients' functional deficits,

movement patterns, and rehabilitation goals. Appropriate programme design, supervision, and progression of exercises appear to be important factors influencing treatment effectiveness.

Future research should focus on standardizing Pilates intervention protocols, identifying the optimal exercise dose and programme duration, and evaluating long-term clinical outcomes. Additional high-quality randomized controlled trials are needed to strengthen the evidence base and further define the role of Pilates within contemporary evidence-based rehabilitation for chronic non-specific low back pain.

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Conflict of Interest Statement: The authors declare no conflict of interest.

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