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Physiotherapy Role in Multiple Sclerosis Management: Review Article

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ABSTRACT

Multiple sclerosis (MS) is a chronic, immune-mediated disorder of the central nervous system characterized by progressive impairments in mobility, balance, strength, fatigue, and participation in daily life. While pharmacological disease-modifying therapies primarily target inflammatory activity, they exert limited influence on established disability and many functionally relevant symptoms. Physiotherapy therefore represents a cornerstone of non-pharmacological management across the MS disease spectrum. This narrative review synthesizes peer-reviewed evidence published examining the role of physiotherapy in MS management. Key intervention domains include exercise-based therapies (aerobic, resistance, and sensorimotor training), mobility and gait rehabilitation, balance and fall-prevention strategies, spasticity and upper limb management, robot-assisted training, and telerehabilitation and home-based models of care. Across disease phenotypes and disability levels, physiotherapy interventions are consistently associated with improvements in gait performance, balance, walking endurance, fatigue, depressive symptoms, and health-related quality of life. Technology-assisted approaches, particularly robot-assisted gait training and telerehabilitation, demonstrate promise for individuals with advanced disability and for improving access to care. Despite these benefits, gaps remain regarding long-term outcomes, standardization of intervention dosage, and evidence for non-ambulatory populations. Physiotherapy remains an essential component of multidisciplinary MS care, supporting functional capacity, independence, and well-being, and should be integrated early and sustained across the disease course.

Keywords: *Multiple sclerosis, Physiotherapy, Exercise therapy, Gait rehabilitation, Balance training, Telerehabilitation*

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INTRODUCTION

Multiple sclerosis (MS) is a chronic, immune-mediated demyelinating disorder of the central nervous system and one of the leading non-traumatic causes of neurological disability in young adults worldwide. It affects more than 2.8 million individuals globally and typically presents between the ages of 20 and 40 years, a period of high educational, vocational, and social engagement (Walton *et al.*, 2020). The disease course is heterogeneous, encompassing relapsing–remitting MS (RRMS), primary progressive MS (PPMS), and secondary progressive MS (SPMS), each characterized by distinct patterns of inflammatory activity, neurodegeneration, and disability accumulation (Walton *et al.*, 2020). This heterogeneity complicates both prognostication and long-term management.

Clinically, MS manifests through a broad constellation of symptoms, including motor impairments (muscle weakness, spasticity, impaired coordination and balance), sensory disturbances, visual deficits, fatigue, pain, cognitive dysfunction, and affective disorders such as depression and anxiety (Thompson *et al.*, 2020; Walton *et al.*, 2020). These symptoms frequently coexist and interact, leading to progressive reductions in mobility, functional independence, participation in daily activities, and overall quality of life. Importantly, disability in MS is not solely attributable to relapse activity but also to gradual functional decline driven by deconditioning, maladaptive movement strategies, and reduced physical

activity—factors that are potentially modifiable through rehabilitation (Thompson *et al.*, 2020).

Pharmacological disease-modifying therapies (DMTs) have transformed the management of relapsing forms of MS by reducing relapse rates and radiological disease activity. However, their impact on long-term disability, especially in progressive phenotypes, remains limited (Dobson & Giovannoni, 2021). Moreover, DMTs do not directly address many of the symptoms that most profoundly affect daily functioning, such as fatigue, balance impairment, gait dysfunction, and spasticity. Consequently, symptomatic management and rehabilitation interventions are essential components of comprehensive MS care across the disease spectrum, complementing pharmacological treatment and addressing functional limitations that accumulate over time (Dobson & Giovannoni, 2021).

Physiotherapy constitutes a central pillar of MS rehabilitation, encompassing structured exercise programs, gait and balance training, manual therapy, functional task practice, and an increasing range of technology-assisted interventions. Traditionally, physiotherapy in MS emphasized compensatory strategies and energy conservation. Contemporary rehabilitation paradigms, however, increasingly prioritize active, task-specific, and progressive interventions aimed at improving physical capacity, promoting neuroplasticity, and counteracting secondary complications such as muscle weakness, cardiovascular deconditioning, and fall risk (Centonze *et al.*, 2020; Donzé *et al.*, 2021). Growing evidence supports the safety and efficacy of appropriately dosed aerobic, resistance, and balance training across a wide range of disability levels, challenging earlier assumptions that exercise might exacerbate disease activity or fatigue (Donzé *et al.*, 2021).

The COVID-19 pandemic marked a significant inflection point in MS rehabilitation delivery, accelerating the adoption of telerehabilitation and home-based physiotherapy models. These approaches have demonstrated feasibility and effectiveness in maintaining functional gains while reducing geographical, logistical, and infection-related barriers to care (Duan *et al.*, 2023). Beyond pandemic-related constraints, remote and hybrid rehabilitation models offer long-term potential for improving access and continuity of physiotherapy for individuals with MS, particularly those with mobility limitations or residing in underserved regions.

The rehabilitation literature has increasingly emphasized individualized, multidisciplinary approaches to MS management. Advances in technology-assisted physiotherapy—such as robotic-assisted gait training, virtual reality–based balance training, and exergaming—have expanded the therapeutic toolkit, offering engaging and intensive modalities that may enhance adherence and functional outcomes (Chasiotis *et al.*, 2023; Pastana Marques *et al.*, 2023). At the same time, persistent challenges remain, including substantial heterogeneity in MS phenotypes, variability in outcome measures, inconsistent reporting of intervention dosage and progression, and inequities in access to specialized rehabilitation services (Binshalan *et al.*, 2022). These factors complicate evidence synthesis and limit the translation of research findings into routine clinical practice. The evolving role of physiotherapy across MS phenotypes, disability levels, and rehabilitation modalities is summarized in **Figure 1**.

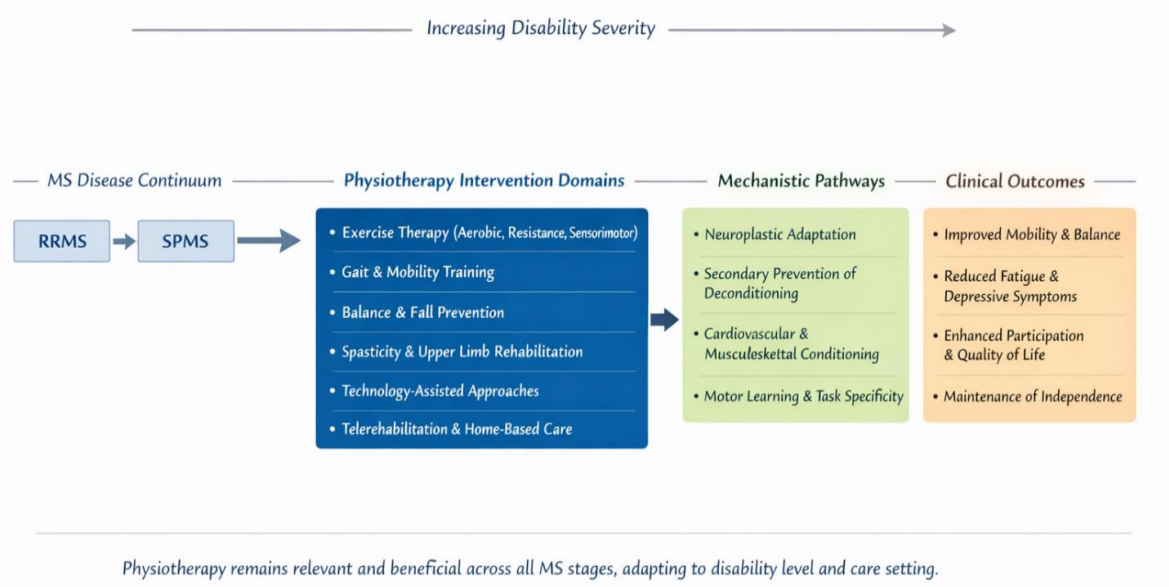

Figure 1. Conceptual Framework of Physiotherapy Across the MS Disease Course

Against this backdrop, a focused synthesis of recent evidence is warranted to clarify the current role of physiotherapy in MS care. This narrative review aims to critically examine peer-reviewed literature published addressing physiotherapy interventions for individuals with MS. Specifically, it seeks to evaluate the effectiveness of key rehabilitation strategies—including exercise therapy, balance and fall-prevention programs, robot-assisted training, telerehabilitation, and

spasticity management—across different levels of disability and disease phenotypes. In addition, the review explores proposed mechanisms underlying observed benefits, such as neuroplastic adaptation and functional compensation, and discusses implications for clinical practice while identifying gaps to guide future research.

Overview of physiotherapy in MS rehabilitation

Physiotherapy in multiple sclerosis (MS) is inherently multifaceted, reflecting the complex and evolving interaction between inflammatory activity, neurodegeneration, secondary deconditioning, and psychosocial factors across the disease course. Contemporary MS physiotherapy integrates kinesiotherapy, aerobic and resistance exercise, manual techniques, hydrotherapy, task-oriented functional training, and an expanding range of technology-assisted modalities to address impairments from early to advanced stages of disability (Yang *et al.*, 2023). Rather than targeting isolated symptoms, modern physiotherapy adopts a systems-oriented approach aimed at preserving mobility, promoting participation, and mitigating secondary complications such as inactivity-related decline, falls, and social withdrawal.

Early referral and assessment by physiotherapists with MS-specific expertise is increasingly recognized as critical to optimizing long-term outcomes. Comprehensive evaluation enables individualized intervention planning that accounts for disease phenotype, symptom variability, fatigue patterns, comorbidities, and personal goals, allowing physiotherapy to remain relevant and effective regardless of disease severity (Yeh *et al.*, 2020). Importantly, physiotherapy is no longer restricted to periods of overt functional decline; instead, it is increasingly implemented proactively to maintain capacity and delay disability accumulation.

The setting and mode of physiotherapy delivery have received renewed attention in recent years. While hospital- or center-based rehabilitation programs may confer superior short-term gains due to higher intensity and multidisciplinary integration, growing evidence indicates that home-based and remotely delivered physiotherapy can achieve comparable functional outcomes when appropriately structured and supervised (Fortunato *et al.*, 2021; Duan *et al.*, 2023). The COVID-19 pandemic accelerated the adoption of telerehabilitation, highlighting its feasibility, acceptability, and potential to overcome longstanding access barriers related to mobility limitations, geographic distance, and healthcare resource constraints (Duan *et al.*, 2023). These developments have reshaped MS rehabilitation models toward more flexible, hybrid approaches that prioritize continuity of care. A structured overview of major physiotherapy interventions and reported outcomes in recent literature is provided in **Table 1**.

Table 1. Summary of Physiotherapy Interventions and Evidence

Intervention Domain	Typical Modalities	Target Population	Key Outcomes Reported
Exercise therapy	Aerobic, resistance, sensorimotor	Mild–moderate MS	Fatigue ↓, strength ↑, QoL ↑
Gait rehabilitation	Functional training, RAGT	Ambulatory and severe MS	Gait speed ↑, endurance ↑
Balance training	Multicomponent, exergaming	Ambulatory MS	Falls ↓, balance confidence ↑
Spasticity management	Stretching, ROM, neuromodulation	All disability levels	Tone ↓, movement efficiency ↑
Telerehabilitation	Remote exercise, monitoring	All MS phenotypes	Access ↑, adherence ↑

Physiotherapy is most effective when embedded within multidisciplinary rehabilitation frameworks. Coordinated programs involving physiotherapists alongside occupational therapists, physicians, psychologists, and speech therapists have demonstrated benefits across activity, participation, and health-related quality of life domains (Loro *et al.*, 2023). Core elements of effective MS physiotherapy include patient-centered goal-setting, individualized progression based on tolerance and response, and systematic outcome monitoring aligned with the International Classification of Functioning, Disability and Health (ICF) framework (Loro *et al.*, 2023). Although heterogeneity in outcome measures continues to limit direct comparison across studies, the overall body of evidence consistently supports the safety and positive impact of physiotherapy on physical, psychological, and social functioning in people with MS (Parsaei *et al.*, 2024). A pragmatic physiotherapy-led rehabilitation pathway for individuals with MS is illustrated in **Figure 2**.

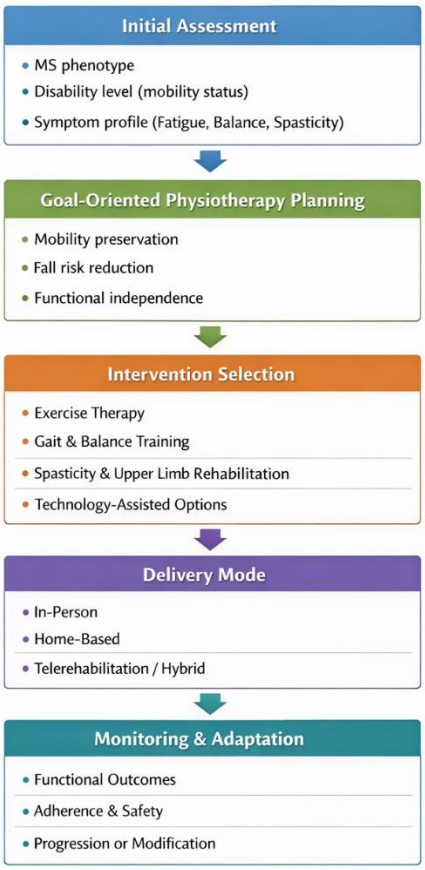

Figure 2. Physiotherapy-Led Rehabilitation Pathway in MS

Exercise therapy and physical activity

Exercise therapy constitutes the cornerstone of physiotherapy in MS rehabilitation. Once discouraged due to concerns about symptom exacerbation, exercise is now firmly established as a safe and beneficial intervention with effects extending beyond physical conditioning to encompass fatigue reduction, mood enhancement, cardiovascular health, and overall well-being (Paul *et al.*, 2023). Systematic reviews published confirm that structured exercise interventions significantly reduce depressive symptoms in individuals with MS, with remote and home-based programs demonstrating efficacy comparable to traditional in-person delivery (Learmonth *et al.*, 2023).

Importantly, individualized remote exercise programs—when incorporating baseline assessment, goal alignment, and ongoing supervision—have been shown to yield moderate reductions in depression (Hedges' g = −0.41), supporting their clinical relevance in both physical and mental health domains (Learmonth *et al.*, 2023). Adjunctive strategies such as motor imagery further augment exercise effects, potentially by enhancing motor planning, engagement, and neuroplastic adaptation (Learmonth *et al.*, 2023).

Current physical activity guidelines for MS generally recommend at least 150 minutes per week of moderate-intensity aerobic activity, complemented by resistance and balance training, with progressive implementation to accommodate symptom fluctuations, fatigue, and heat sensitivity (Casuso-Holgado *et al.*, 2018). Flexibility in program design is essential, as adherence and benefit depend on matching exercise demands to individual capacity and disease variability. Emerging evidence suggests that regular physical activity may exert neuroprotective effects, particularly in progressive MS, potentially through mechanisms involving neurotrophic signaling, synaptic plasticity, and improved cerebral perfusion (Hendricksen *et al.*, 2024).

Across modalities, aerobic training improves cardiorespiratory fitness and walking endurance; resistance training enhances strength and functional capacity; and combined or multimodal programs yield broader gains in mobility and quality of life (Kalron *et al.*, 2022). Notably, sensorimotor training—including balance, coordination, and proprioceptive exercises—appears particularly effective in improving overall health-related quality of life, underscoring the importance of integrating neuromotor components alongside traditional fitness training (Kalron *et al.*, 2022).

Mobility and gait interventions

Gait impairment is among the most functionally limiting and patient-prioritized consequences of MS, often emerging early and progressing with disease severity (Tollár *et al.*, 2023). Physiotherapy remains both feasible and beneficial even in individuals with severe disability (Expanded Disability Status Scale [EDSS] ≥ 6.0), challenging assumptions that rehabilitation effectiveness diminishes in advanced MS. In this population, robot-assisted gait training (RAGT) has demonstrated significant improvements in walking endurance, gait speed, balance, and fatigue, as measured by outcomes such as the 6-minute walk test, 10-metre walk test, Berg Balance Scale, and fatigue scales (Marques *et al.*, 2020).

Meta-analyses published during the review period indicate that RAGT is superior to conventional gait training for key gait parameters in both ambulatory and non-ambulatory individuals with MS (Pilutti & Donkers, 2024). These findings support the use of technology-assisted approaches to deliver high-repetition, task-specific training that may be difficult to achieve through conventional therapy alone. Beyond robotics, dose–response analyses highlight the importance of tailored neuromotor rehabilitation strategies, including rhythmic auditory stimulation and exergaming, for improving walking capacity and engagement (Kalb *et al.*, 2020).

Functional exercise training, which simultaneously targets mobility, strength, balance, and endurance through task-oriented activities, has shown particular promise in addressing the multidimensional nature of gait dysfunction in MS (Learmonth *et al.*, 2021). Such approaches align with contemporary rehabilitation principles emphasizing integration of impairments rather than isolated training of single components.

Balance training and fall prevention

Balance impairment is highly prevalent in MS and contributes to disproportionately high fall rates, even among individuals with relatively mild disability (Yang *et al.*, 2023). Falls are associated with injury, reduced confidence, activity restriction, and diminished quality of life, making fall prevention a key objective of physiotherapy. Evidence from recent trials indicates that physiotherapy-led balance interventions—particularly home-based, multicomponent programs incorporating strength, coordination, and proprioceptive training—significantly reduce

the proportion of ambulatory fallers, with reported risk ratios as low as 0.53 (Yang *et al.*, 2023).

Technology-assisted modalities, including exergaming, robotic balance training, and sensory integration exercises, have demonstrated additional benefits in improving postural control and balance confidence (Centonze *et al.*, 2020). These interventions may enhance motivation and adherence while providing real-time feedback to facilitate motor learning.

Despite these advances, evidence for effective balance interventions in non-ambulatory individuals with MS remains limited, representing a critical gap in the literature (Yang *et al.*, 2023). Emerging approaches advocate for personalized balance protocols stratified by factors such as ataxia severity, incorporating neurodevelopmental treatment (NDT-Bobath) principles, robotic feedback systems, and functional task practice to maximize residual postural control and safety (Donzé *et al.*, 2021). Addressing this underrepresented population is a priority for future research and clinical innovation.

Management of spasticity, upper limb function, and other symptoms

Spasticity is a common and functionally limiting symptom in MS, contributing to pain, reduced mobility, impaired dexterity, and secondary musculoskeletal complications. Conventional physiotherapy remains a first-line non-pharmacological strategy for spasticity management, employing stretching, positioning, active and passive range-of-motion exercises, strengthening of antagonist muscle groups, and functional task practice (Duan *et al.*, 2023). These interventions aim not only to reduce muscle tone but also to preserve joint integrity, optimize movement efficiency, and maintain participation in daily activities. In recent literature, adjunctive non-invasive neuromodulatory techniques—such as transcutaneous electrical nerve stimulation and other forms of peripheral stimulation—have emerged as promising complements to conventional physiotherapy, although evidence remains preliminary and heterogeneous (Duan *et al.*, 2023).

Upper limb dysfunction significantly affects independence and quality of life in MS, particularly through impairments in reach, grasp, fine motor control, and bimanual coordination. Physiotherapy-based upper limb rehabilitation increasingly emphasizes task-specific, repetitive practice grounded in principles of motor learning and neuroplasticity. Interventions such as action observation therapy, motor imagery, and constraint-induced movement therapy have demonstrated benefits in improving upper limb function and motor control, particularly in individuals with mild to moderate disability (Duan *et al.*, 2023). For patients with more severe impairment, robotic-assisted upper limb devices provide high-intensity, repetitive, and task-oriented training that may not be achievable through conventional therapy alone. These technologies enable graded assistance and feedback, potentially enhancing engagement and facilitating residual motor recovery.

Beyond motor symptoms, physiotherapy interventions—particularly when integrated with structured exercise programs—have demonstrated beneficial effects on non-motor symptoms, including depression, fatigue, and aspects of cognitive functioning. Remote and home-based exercise programs incorporating individualized assessment, goal-setting, and supervision have shown clinically meaningful reductions in depressive symptoms, supporting the role of physiotherapy in addressing psychosocial dimensions of MS (Learmonth *et al.*, 2023). Collectively, these findings reinforce the concept that physiotherapy extends beyond symptom compensation, supporting neuroplastic adaptation and potentially contributing to slower functional decline over time (Hendricksen *et al.*, 2024).

Telerehabilitation and technology-assisted approaches

The COVID-19 pandemic catalyzed rapid adoption of telerehabilitation in MS care, transforming physiotherapy delivery from predominantly in-person models to remote and hybrid formats. Evidence published demonstrates that telerehabilitation is effective for delivering exercise therapy, monitoring symptoms, and maintaining therapeutic engagement, with outcomes comparable to conventional face-to-face interventions in many domains (Binshalan *et al.*, 2022; Duan *et al.*, 2023). These approaches have proven particularly valuable in addressing barriers related to fatigue, transportation, geographic isolation, and healthcare access.

Digital platforms enable structured exercise prescription, real-time feedback, and asynchronous monitoring, supporting continuity of care while promoting patient autonomy. However, adaptations are often necessary to accommodate visual impairment, cognitive dysfunction, and upper limb dexterity limitations commonly encountered in MS populations (Parsaei *et al.*, 2024). Accessibility and usability therefore remain critical considerations in the design and implementation of telerehabilitation systems.

Exergaming and web-based physiotherapy platforms have gained prominence as engaging and scalable tools for gait, balance, and coordination training. Studies report improvements in postural control, walking performance, and health-related quality of life, alongside high adherence and patient satisfaction (Paul *et al.*, 2023). Similarly, robot-assisted and virtual reality–based interventions are increasingly explored as home-based or semi-supervised options, with evidence supporting positive short-term effects on gait, balance, and functional mobility (Marques *et al.*, 2020; Chasiotis *et al.*, 2023). While these technologies expand therapeutic possibilities, their long-term effectiveness, cost-efficiency, and integration into routine clinical practice require further investigation.

RESULTS AND DISCUSSION

The evidence synthesized from peer-reviewed studies published underscores physiotherapy as an essential, evidence-based component of comprehensive MS management. Across diverse intervention types and delivery formats, physiotherapy consistently demonstrates benefits in key outcome domains, including mobility, balance, fatigue, depressive symptoms, and quality of life, with favorable safety and feasibility profiles across a wide range of disability levels (Centonze *et al.*, 2020; Thompson *et al.*, 2020; Walton *et al.*, 2020; Dobson & Giovannoni, 2021). These findings reinforce the central role of rehabilitation alongside pharmacological therapies, particularly given the limited impact of disease-modifying treatments on established disability.

Exercise therapy emerges as the most robust and consistently supported physiotherapy modality in MS. Multiple systematic

reviews and meta-analyses confirm its positive effects on physical function, mood, and overall well-being, with emerging evidence suggesting potential neuroprotective effects, particularly in progressive disease (Donzé *et al.*, 2021; Duan *et al.*, 2023; Pastana Marques *et al.*, 2023). Aerobic, resistance, and sensorimotor training each contribute distinct benefits, with multimodal and sensorimotor-focused programs demonstrating particularly strong effects on health-related quality of life and functional performance (Binshalan *et al.*, 2022; Chasiotis *et al.*, 2023).

Robot-assisted gait training (RAGT) provides superior short-term improvements in gait parameters, fatigue, and spasticity compared with conventional gait training, especially in individuals with severe disability (EDSS ≥ 6.0) (Yeh *et al.*, 2020; Fortunato *et al.*, 2021; Yang *et al.*, 2023). These benefits are likely mediated by high-intensity, repetitive, task-specific practice that enhances proprioceptive input and supports neuroplastic reorganization (Loro *et al.*, 2023). However, uncertainty remains regarding the durability of these gains, and limited availability, cost, and infrastructure requirements restrict widespread implementation (Parsaei *et al.*, 2024).

Telerehabilitation and home-based physiotherapy programs demonstrate outcomes comparable to in-person delivery, offering a viable solution to long-standing access barriers in MS care (Learmonth *et al.*, 2023; Paul *et al.*, 2023). Exergaming and digitally mediated interventions further enhance engagement and adherence, particularly for balance and coordination training (Casuso-Holgado *et al.*, 2018). The pandemic-driven expansion of these models has provided real-world validation of their feasibility, acceptability, and scalability (Hendricksen *et al.*, 2024).

Balance training and fall-prevention interventions, particularly multicomponent home-based programs, significantly reduce fall risk in ambulatory individuals with MS (Kalron *et al.*, 2022). However, evidence for non-ambulatory populations remains sparse, highlighting a critical gap in current research (Tollár *et al.*, 2023). Similarly, while spasticity management benefits from conventional physiotherapy, evidence for adjunctive technologies remains emerging and warrants cautious interpretation (Marques *et al.*, 2020). Key outcome domains and persisting evidence gaps across physiotherapy modalities are summarized in **Table 2**.

Table 2. Physiotherapy Modalities, Target Outcomes, and Evidence Gaps

Modality	Primary Outcomes	Evidence Strength	Key Gaps
Exercise therapy	Fatigue, QoL, strength	High	Long-term disability impact
RAGT	Gait, endurance	Moderate–high	Cost, durability
Balance training	Falls, postural control	Moderate	Non-ambulatory MS
Telerehabilitation	Access, adherence	Moderate	Standardization
Upper limb rehab	Dexterity, function	Low–moderate	Severe disability

Proposed mechanisms underlying physiotherapy benefits include promotion of neuroplasticity, modulation of inflammatory pathways, improvements in cardiovascular fitness, and secondary prevention of deconditioning (Pilutti & Donkers, 2024). The effectiveness of physiotherapy is strongly influenced by individual factors, including MS phenotype, disability level, symptom burden, and comorbidities, underscoring the necessity of personalized rehabilitation strategies (Kalb *et al.*, 2020). Methodological limitations across the literature—such as heterogeneity of interventions, short follow-up durations, underrepresentation of progressive MS, reliance on self-reported outcomes, and limited blinding—temper the strength of conclusions and highlight the need for more rigorous study designs (Learmonth *et al.*, 2021; Yang *et al.*, 2023).

CONCLUSION

Physiotherapy constitutes an integral component of comprehensive multiple sclerosis care, providing safe, effective, and evidence-based strategies to address symptom burden, functional limitation, and participation restriction across all stages of the disease. The literature published consistently demonstrates that physiotherapy interventions yield meaningful improvements in mobility, balance, fatigue, mood, and health-related quality of life, with favorable safety profiles across a broad range of disability levels. These benefits are particularly salient given the limited capacity of disease-modifying therapies to reverse established disability or address many functionally relevant symptoms.

Among available modalities, exercise-based interventions emerge as the most robustly supported, conferring benefits that extend beyond physical conditioning to include psychological well-being and potentially neuroprotective effects. Robot-assisted gait training offers valuable short-term gains in gait performance, fatigue, and spasticity, particularly for individuals with advanced disability, while telerehabilitation and home-based programs provide effective and accessible alternatives to traditional in-person delivery. Collectively, these approaches underscore the evolving role of physiotherapy as an active, adaptive, and patient-centered discipline rather than a purely compensatory intervention.

To maximize impact, physiotherapy should be embedded within multidisciplinary rehabilitation frameworks and delivered through individualized programs that account for disease phenotype, disability severity, symptom variability, and personal goals. Early integration of physiotherapy into the MS care pathway is recommended to preserve function, mitigate secondary decline, and support long-term participation and quality of life.

Future directions

Despite substantial progress, important gaps remain in the physiotherapy evidence base for multiple sclerosis. Future research should prioritize long-term follow-up to determine the durability of functional gains and clarify whether sustained physiotherapy engagement influences disability trajectories,

particularly in progressive MS phenotypes that remain underrepresented in clinical trials. Greater standardization of intervention protocols and outcome measures is needed to improve comparability across studies and facilitate translation into clinical guidelines.

Integration of physiotherapy with disease-modifying therapies represents a promising area for investigation, particularly with respect to timing, synergy, and individualized treatment sequencing. Advances in technology-enhanced delivery—such as telerehabilitation platforms, wearable monitoring, and AI-driven personalization of exercise prescription—offer opportunities to optimize dose, adherence, and responsiveness while expanding access. Additionally, sex- and gender-specific responses to physiotherapy interventions warrant focused exploration, given known differences in MS epidemiology, symptom burden, and functional outcomes.

Methodologically, future trials should emphasize adequately powered, blinded randomized controlled designs with objective outcome measures and transparent reporting of adherence and adverse events. Addressing these priorities will strengthen the evidence base and support the development of precise, scalable, and equitable physiotherapy strategies for individuals living with multiple sclerosis.

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