TPM Vol. 32, No. S6, 2025
ISSN: 1972-6325
https://www.tpmap.org/

Open Access

MIND-BODY INTERACTION IN PHYSIOTHERAPY: PSYCHOLOGICAL IMPLICATIONS FOR REHABILITATION

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Summary
Contemporary physiotherapy recognises mind-body interaction as an essential factor in rehabilitation processes. The integrated psychological approach improves the functional recovery and emotional well-being of patients. This article analyzes the psychological implications of the mind-body relationship in physiotherapy, based on recent literature. An interdisciplinary theoretical framework was developed that articulates neuroscience, health psychology and physiotherapeutic practices. The methodology consisted of a narrative review of empirical studies and meta-analyses published in the last five years. The results show that the incorporation of interventions based on emotional regulation, mindfulness and intrinsic motivation increases adherence to treatments and accelerates recovery. It is concluded that an integrative model between physiotherapy and psychology strengthens resilience, reduces the perception of pain and enhances the effectiveness of rehabilitation programs.
Keywords: physiotherapy, mind-body interaction, rehabilitation, health psychology, neuroscience.

INTRODUCTION

Physiotherapy has undergone a substantial transformation in the last decade by moving from a strictly biomedical paradigm to a more integrative one, where psychological, emotional, and social factors in the recovery process are recognized (Carvalho et al., 2022). This change responds to the growing evidence that health cannot be addressed solely from the physical, since the patient's emotional states, beliefs, and motivation have a direct impact on the effectiveness of rehabilitation (Domenech et al., 2020).

Mind-body interaction is understood as the dynamic relationship between cognitive, emotional, and physiological processes that influence both pain perception and functional recovery (Turner et al., 2021). For example, it has been shown that anxiety and depression can intensify pain perception and prolong recovery time, while psychological resilience and intrinsic motivation favor adherence to therapeutic programs (Stubbs et al., 2020).

From the perspective of **health psychology**, rehabilitation is conceived as an active process in which the patient's participation is fundamental. In this sense, approaches that include techniques such as **mindfulness**, **motor imagery,** and **cognitive-behavioral interventions** have shown significant benefits in reducing chronic pain and improving quality of life (Gálvez-Sánchez et al., 2021; Kabat-Zinn et al., 2021). These tools contribute to emotional regulation, reduce pain catastrophizing, and enhance brain plasticity, which positively impacts clinical outcomes (Bordoloi et al., 2023).

Likewise, contemporary neuroscience supports the integration of these approaches by demonstrating that the central nervous system responds differently when the patient maintains a positive and active attitude during

rehabilitation (Carvalho et al., 2022). Neural plasticity, understood as the brain's ability to reorganize and adapt, is reinforced when physical and cognitive dimensions are simultaneously stimulated (Bordoloi et al., 2023).
In this context, physiotherapy should not only focus on the patient's biomechanical recovery, but also on psychological support that allows them to cope with pain, maintain motivation and promote resilience throughout the process. This article aims to analyze, from an interdisciplinary perspective, the psychological implications of mind-body interaction in physiotherapy, reviewing the most recent scientific literature and highlighting its relevance for the design of more effective and patient-centered rehabilitation programs.

THEORETICAL FRAMEWORK

Mind-body interaction in physiotherapy is based on a **biopsychosocial** approach, which recognizes that health and disease are the result of a complex interaction between biological, psychological, and social factors (Stubbs et al., 2020). This model has progressively replaced the traditional biomedical paradigm, promoting the integration of psychological strategies in physical rehabilitation.

Psychological dimension in physiotherapy

In the field of rehabilitation, emotional and cognitive factors determine the **perception of pain** and **adherence to treatment**. Recent studies show that anxiety and depression are associated with higher levels of pain and lower functional progress in patients with musculoskeletal pathologies (Carvalho et al., 2022). Similarly, intrinsic motivation and social support favor treatment continuity and resilience strengthening (Domenech et al., 2020).
Pain **catastrophizing**, understood as the tendency to exaggerate the threat of pain and feel unable to manage it, is related to worse outcomes in physiotherapy (Turner et al., 2021). Cognitive-behavioral interventions have been shown to reduce this pattern, facilitating active participation in rehabilitation programs.

Neuroscience and brain plasticity

Contemporary neuroscience has provided evidence on **brain plasticity**, understood as the ability of the nervous system to reorganize and form new neural connections in response to physical and psychological stimuli (Bordoloi et al., 2023). Techniques such as **motor imagery** and **mindfulness-based training** stimulate cortical areas related to motor skills and emotional regulation, thus enhancing the recovery of patients with neurological damage (Gálvez-Sánchez et al., 2021).

Integrated therapeutic approaches

The interdisciplinary approach that unites physiotherapy and clinical psychology has shown benefits in patients with chronic pain and complex injuries. Programs that combine **therapeutic exercise** with **emotional regulation and mindfulness** not only improve physical function, but also reduce pain perception and improve quality of life (Kabat-Zinn et al., 2021).
Below are comparative tables illustrating recent contributions from different approaches:

Table 1. Psychological factors influencing physiotherapeutic rehabilitation

Psychological factor	***Impact on rehabilitation***	***Recent Evidence***
Anxiety and depression	Increase the perception of pain, reduce adherence	Carvalho et al. (2022)
Intrinsic motivation	Supports treatment continuity and resilience	Domenech et al. (2020)
Catastrophizing Pain	Is associated with greater functional limitations	Turner et al. (2021)
Psychological resilience	Boosts recovery and reduces relapses	Stubbs et al. (2020)

Table 2. Mind-body strategies applied in physiotherapy

Strategy	***Description***	***Reported Benefits***	***Recent Evidence***
Mindfulness	Mindfulness and Body Awareness Training	Stress reduction, improved quality of life	Gálvez-Sánchez et al. (2021); Kabat-Zinn et al. (2021)
Motor imagery	Mental simulation of movements without physical execution	Enhances brain plasticity and motor recovery	Bordoloi et al. (2023)
Cognitive behavioral therapy	Modification of beliefs and behaviors related to pain	Decreases catastrophizing, improves adherence	Turner et al. (2021)

Psychosocial support	Integration of the family and social environment in rehabilitation	Increases adherence and resilience	Domenech et al. (2020)

Table 3. Explanatory models of mind-body interaction in rehabilitation

Model	***Main focus***	***Application in physiotherapy***	***Recent Evidence***
Biopsychosocial	It integrates biological, psychological and social dimensions	Comprehensive evaluation of the patient and their environment	Stubbs et al. (2020)
Neurocognitive	Based on brain plasticity and neuroscience	Use of imagery techniques and cognitive stimulation	Bordoloi et al. (2023)
Cognitive-behavioral	Modification of dysfunctional thoughts and behaviors	Reduced anxiety, depression, and catastrophizing	Turner et al. (2021)
Mind-body integrative	Promotes emotional and physical balance through holistic practices	Improved well-being and reduced chronic pain	Kabat-Zinn et al. (2021)

With this theoretical framework, it is established that physiotherapy, in order to be effective in the contemporary context, must include an explicit psychological component, oriented to both emotional regulation and brain plasticity. This integration ensures better clinical outcomes and a more humane and comprehensive approach to rehabilitation.

METHODOLOGY

The present research is framed in a **narrative review design**, complemented with elements of systematic review, with the aim of exploring the mind-body relationship in physiotherapy and its psychological implications for rehabilitation. This type of review allows the integration of findings from different disciplines, such as physiotherapy, health psychology, and neuroscience, generating an interdisciplinary vision (Snyder, 2019; Ferrari, 2022).

Search strategy

A structured search was carried out in the **PubMed, Scopus, Web of Science and PsycINFO** databases, covering the period between **2019 and 2024**, in accordance with the methodological recommendations for updated reviews (Page et al., 2021). The keywords used were: *physiotherapy*, *mind-body interaction*, *psychological rehabilitation*, *neuroplasticity* and *chronic pain*. Boolean operators (AND, OR) were used and year and publication type filters (peer-reviewed articles) were applied.

Inclusion and exclusion criteria

The inclusion criteria considered empirical studies, systematic reviews and meta-analyses that:

1. They will analyze the mind-body interaction in physiotherapy processes.
2. Evaluate psychological variables linked to rehabilitation.
3. Were published in English or Spanish between 2019-2024.

On the other hand, publications without methodological rigor, isolated case studies, and gray literature were excluded, following recommendations for methodological transparency in research (Xiao & Watson, 2019).

Selection procedure

The selection was made in three phases: (1) identification of articles, (2) screening by title and abstract, and (3) full-text review. Two review authors performed the process independently to ensure reliability, resolving discrepancies by consensus.

Data synthesis and analysis

The data were organized using **comparative matrices** that allowed the identification of recurrent categories: pain perception, therapeutic adherence, brain plasticity and emotional well-being. A **thematic analysis** approach was applied, useful for synthesizing findings in narrative reviews (Braun & Clarke, 2021).

Table 1. Search strategy

Database	***Keywords***	***Initial number of articles***	***Filters applied***	***Final Selection***
PubMed	"physiotherapy AND mind-body interaction"	154	2019–2024; peer-reviewed	32

Scopus	"psychological rehabilitation AND physiotherapy"	121	2019–2024; human studies	27
Web of Science	"neuroplasticity AND rehabilitation"	138	2019–2024; English/Spanish	30
PsycINFO	"chronic pain AND mind-body physiotherapy"	98	2019–2024; reviews/meta-analysis	21
Total	—	**511**	—	**110**

Table 2. Inclusion and exclusion criteria

Criterion	***Inclusion***	***Exclusion***
Language	English and Spanish	Other languages
Type of study	Clinical trials, systematic reviews, meta-analyses	Clinical cases, grey literature
Year of publication	2019–2024	< 2019
Thematic	Mind-body interaction in physiotherapy	Medical interventions without a psychological component

Table 3. Thematic Analysis Categories

Category	***Description***	***Example of findings***	***Recent Source***
Pain perception	Relationship between cognitive processes and painful sensation	Mindfulness reduces chronic pain	Gálvez-Sánchez et al. (2021)
Therapeutic adherence	Motivational and emotional factors in continuity of treatment	Intrinsic motivation improves adherence	Domenech et al. (2020)
Brain plasticity	Neurocognitive changes linked to rehabilitation	Motor imagery: power, motor recovery	Bordoloi et al. (2023)
Emotional well-being	Psychological strategies in stress regulation and resilience	Mind-body therapy reduce ansiedad	Kabat-Zinn et al. (2021)

In this way, the methodology applied ensures a **rigorous and up-to-date analysis**, ensuring that the results reflect the most recent trends in the field of physiotherapy and health psychology.

RESULTS

The analysis of the 110 selected studies identified **four major dimensions** of mind-body interaction in physiotherapy: (1) pain perception, (2) adherence to treatment, (3) brain plasticity and (4) emotional well-being. These dimensions show how psychological factors directly influence the effectiveness of rehabilitation.

1. Pain perception

The studies reviewed confirm that psychological interventions such as cognitive behavioral therapy (CBT) and mindfulness significantly reduce the intensity of perceived pain in patients with chronic pain. Turner et al. (2021) reported reductions of between **25% and 35% in pain perception** in programs that integrated CBT into conventional physiotherapy. Likewise, Gálvez-Sánchez et al. (2021) showed that mindfulness-based interventions achieved improvements in pain tolerance and decreased catastrophizing.

2. Adherence to treatment

Intrinsic motivation, psychosocial accompaniment and psychological support were key in adherence to physiotherapy programs. Domenech et al. (2020) found that patients with programs that included intrinsic motivation components had an **adherence rate of 82%,** in contrast to **60%** of patients in conventional programs. These findings underscore the need to incorporate psychological strategies into therapeutic design.

3. Brain plasticity

Neuroscientific evidence showed that **motor imagery** combined with physiotherapy improves cortical reorganization and motor recovery. Bordoloi et al. (2023) reported that patients who participated in motor imagery programs experienced a **40% improvement in motor function** after stroke, compared to 25% in control groups that received conventional physiotherapy alone.

4. Emotional well-being and resilience

The integration of psychological techniques in physiotherapy also favored emotional well-being. Kabat-Zinn et al. (2021) showed that patients undergoing mindfulness and physiotherapy programs reduced their levels of

anxiety and depression by **30% on average**, increasing psychological resilience in the face of the rehabilitation process.

Table 1. Effects of psychological interventions on pain perception

Intervention	*Reduction of perceived pain*	*Fountain*
Cognitive Behavioral Therapy + Physical Therapy	25–35 %	Turner et al. (2021)
Mindfulness applied to patients with chronic pain	30 %	Gálvez-Sánchez et al. (2021)
Pain Neuroscience Education	22 %	Carvalho et al. (2022)

Table 2. Adherence to physiotherapy programs

Program Type	*Level of adherence*	*Fountain*
Conventional Physical Therapy	60 %	Domenech et al. (2020)
Physiotherapy + intrinsic motivation	82 %	Domenech et al. (2020)
Physiotherapy + psychosocial support	78 %	Stubbs et al. (2020)

Table 3. Impact of Motor Imagery on Neurological Rehabilitation

Group	*Improved motor functionality*	*Fountain*
Conventional Physical Therapy	25 %	Bordoloi et al. (2023)
Physiotherapy + motor imagery	40 %	Bordoloi et al. (2023)
Physiotherapy + cognitive stimulation	38 %	Gálvez-Sánchez et al. (2021)

Table 4. Emotional Outcomes in Mind-Body Programs

Psychological indicator	*Reported improvement*	*Fountain*
Anxiety reduction	30 %	Kabat-Zinn et al. (2021)
Decreased depression	28 %	Gálvez-Sánchez et al. (2021)
Increased resilience	35 %	Stubbs et al. (2020)

Summary of the results

The findings show that **integrative mind-body programs** significantly outperform exclusively biomedical approaches. Patients not only report lower levels of pain, but also **greater adherence, better functional recovery, and enhanced emotional well-being**. Evidence suggests that the incorporation of these strategies should be considered as a standard part in contemporary physiotherapy programmes.

Conclusions

The present research allows us to conclude that **the mind-body interaction constitutes a fundamental pillar in contemporary physiotherapy**, especially in the rehabilitation processes of patients with chronic pain, musculoskeletal injuries and neurological disorders. The evidence reviewed demonstrates that programs that integrate psychological components—such as cognitive-behavioral therapy, mindfulness, and motor imagery—generate superior outcomes compared to exclusively biomedical approaches (Turner et al., 2021; Gálvez-Sánchez et al., 2021).

First, **the perception of pain** is significantly modulated by cognitive and emotional factors. Interventions aimed at reducing catastrophizing and fostering resilience contribute to reducing the intensity of perceived pain, which has an impact on better physical functionality (Carvalho et al., 2022). This confirms that the approach to pain cannot be limited to the physiological, but requires integrating cognitive restructuring and emotional regulation strategies (Stubbs et al., 2020).

Second, **therapeutic adherence** emerges as a key element. Patients who receive psychological and motivational support have higher rates of treatment continuity, which translates into better clinical outcomes and a lower risk of relapse (Domenech et al., 2020). This shows that intrinsic motivation and psychosocial support are critical variables in the effectiveness of rehabilitation programs.

Third, **brain plasticity** reinforces the bidirectional nature of mind-body interaction. Techniques such as motor imagery, in combination with physiotherapy, enhance cortical reorganization and accelerate motor recovery in patients with strokes and other neurological pathologies (Bordoloi et al., 2023). These findings support the need to design therapeutic protocols that stimulate both physical and cognitive processes.

Finally, **emotional well-being** and resilience are consolidated as complementary goals in rehabilitation. Programs that incorporate mindfulness and emotional regulation have been shown to reduce anxiety and

depression, which not only favors quality of life, but also reinforces the patient's active participation in the therapeutic process (Kabat-Zinn et al., 2021).

In summary, recent evidence underlines that physiotherapy should be conceived as an **interdisciplinary** discipline, where the integration of psychological and physiological techniques is part of standard clinical practice. It is recommended that future research delves into the development of **standardized mind-body protocols** that allow results to be compared between different pathologies and populations. In addition, it would be pertinent to explore the role of technology—such as mindfulness or virtual reality mobile applications for motor imagery—in strengthening this integration (Bordoloi et al., 2023).

Thus, the physiotherapy of the future is emerging not only as a means of physical recovery, but also as a space for emotional and cognitive transformation that promotes resilience and the patient's comprehensive well-being.

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