

## CLINICAL AND PSYCHOLOGICAL ASPECTS OF IMPLEMENTING A MULTIMODAL APPROACH IN THE INTERDISCIPLINARY CARE OF PATIENTS WITH PAIN SYNDROME

### КЛІНІЧНІ ТА ПСИХОЛОГІЧНІ АСПЕКТИ ВПРОВАДЖЕННЯ МУЛЬТИМОДАЛЬНОГО ПІДХОДУ В МІЖДИСЦИПЛІНАРНІЙ ДОПОМОЗІ ПАЦІЄНТАМ ІЗ БОЛЬОВИМ СИНДРОМОМ

*The article substantiates the clinical and psychological foundations for implementing a multimodal approach within interdisciplinary care for patients with chronic musculoskeletal pain. The relevance of the study is determined by the high prevalence of chronic pain, its leading role in the structure of disability, and the growing biopsychosocial burden under conditions of wartime stress, treatment interruptions, forced migration, and limited access to rehabilitation services. The aim of the study was to scientifically evaluate the clinical and psychological effectiveness of an eight-week multimodal interdisciplinary program and to analyze the mechanisms of positive change from the perspectives of the biopsychosocial and fear-avoidance models of chronic pain. The study employed a prospective single-group design with repeated measurements (T1–T2; n = 68). The program integrated medical supervision with optimization of pharmacotherapy, individually tailored physical therapy with gradual activity progression, and six structured group psychological sessions focused on pain-related psychoeducation, reduction of catastrophizing, development of emotional regulation skills, anxiety reduction, and enhancement of pain self-management. Outcomes were assessed using validated instruments (VAS, BPI, PCS, TSK, HADS, and PSEQ). Following the intervention, statistically and clinically significant reductions were observed in pain intensity and pain-related interference, catastrophizing and kinesiophobia, as well as anxiety and depressive symptoms, alongside a significant increase in pain self-efficacy ( $p < .001$ ; predominantly medium to large effect sizes). Correlational analysis demonstrated associations between changes in cognitive-behavioral indicators and improvements in functional outcomes. The findings support the integration of psychological components into routine chronic pain management and the scaling of multimodal models within Ukrainian clinical settings.*

**Key words:** chronic pain, multimodal approach, interdisciplinary care, pain catastrophizing, kinesiophobia, pain self-efficacy.

*У статті обґрунтовано клінічні та психологічні засади впровадження мультимодального підходу в міждисциплінарній допомозі пацієнтам із хронічним м'язово-скелетним больовим синдромом. Актуальність дослідження зумовлена високою поширеністю хронічного болю, його провідною роллю у структурі інвалідизації та зростанням біопсихосоціального тягаря в умовах воєнного стресу, перерв у лікуванні, вимушеної міграції та обмеженого доступу до реабілітаційних послуг. Метою дослідження було науково оцінити клінічну й психологічну ефективність 8-тижневої мультимодальної міждисциплінарної програми та проаналізувати механізми позитивних змін з позицій біопсихосоціальної та fear-avoidance моделей хронічного болю. Дослідження виконано у форматі проспективного одно-групового дизайну з повторними вимірюваннями (T1–T2; n = 68). Програма включала медичний супровід із оптимізацією фармакотерапії, індивідуалізовану фізичну терапію з поступовим нарощуванням активності та шість структурованих групових психологічних сесій, спрямованих на психоосвіту щодо механізмів болю, роботу з катастрофізацією, формування навичок емоційної регуляції, зниження тривоги та розвиток самоменеджменту. Оцінювання здійснювали за допомогою валідизованих інструментів (VAS, BPI, PCS, TSK, HADS, PSEQ). Після втручання виявлено статистично та клінічно значуще зниження інтенсивності болю й інтерференції, катастрофізації та кінесіофобії, симптомів тривоги й депресії, а також підвищення больової самоефективності ( $p < 0,001$ ; ефекти переважно середні–великі). Кореляційний аналіз засвідчив зв'язок змін когнітивно-поведінкових показників із покращенням функціонування. Отримані результати підтверджують доцільність інтеграції психологічного компонента в систему лікування хронічного болю та масштабування мультимодальної моделі в українських клінічних умовах.*

**Ключові слова:** хронічний біль, мультимодальний підхід, міждисциплінарна допомога, катастрофізація болю, кінесіофобія, больова самоефективність.

UDC 616.8-009.7:616-08:159.9

DOI <https://doi.org/10.32782/hbts.83.1.36>

Стаття поширюється на умовах ліцензії відкритого доступу CC BY 4.0



#### Varina H.B.

Master of Psychology, Senior Lecturer of the Department of Psychology Bogdan Khmel'nitsky Melitopol State Pedagogical University  
ORCID ID: 0000-0002-0087-4264

#### Butska L.V.

Doctor of Medical Sciences, Professor, PhD, MPT, MPbA, Professor of Interregional Academy of Personnel Management (IAPM), Senior Research Fellow of Yu. I. Kundiev Institute of Occupational Medicine, NAMS of Ukraine Taras Shevchenko National University of Kyiv  
ORCID ID: 0000-0002-7928-0177

Pain syndrome is one of the leading causes of reduced quality of life, functional limitations, and long-term loss of work capacity. In its chronic form, it evolves into an independent medico-psychological condition associated with a substantial social and economic burden. At the global level, low back pain is identified as the leading cause of disability measured in years lived with disability (YLDs) [6]. In 2020, it affected an estimated 619 million people worldwide, with projections indicating an increase to 843 million cases by 2050 [15]. This trend necessitates a shift in contemporary pain management from short-term,

symptom-oriented interventions toward long-term care models, in which the restoration of functioning, enhancement of self-management capacities, and prevention of pain chronification become central objectives. The relevance of this problem is particularly pronounced in Ukraine due to the combination of the high population-level prevalence of chronic pain and additional risk factors associated with the full-scale war. Epidemiological data derived from a Ukrainian subsample within an international research project revealed an exceptionally high prevalence of self-reported chronic pain, affecting 60.4% of

respondents. Cervical and spinal pain localisations were most frequently reported (40.3%), and a considerable proportion of participants indicated pain in multiple body regions [6]. Although methodological limitations related to population sampling and self-report measures warrant cautious interpretation, the magnitude of these findings underscores that chronic pain in Ukraine represents a systemic healthcare challenge rather than a marginal clinical issue, requiring coordinated solutions at both clinical and organisational levels. War-related conditions substantially complicate the course of pain disorders through the convergence of traumatic injuries, amputations, neuropathic pain, sleep disturbances, chronic stress, loss and bereavement, forced displacement, interruptions in medical care, and limited access to rehabilitation services. The "Total Pain in Ukraine Study," based on an online survey of 833 patients from five clinical sites and conducted among civilians with a history of chronic pain, reported that 59% of participants experienced pain of moderate to severe intensity [2]. A large proportion described their pain as difficult to tolerate, accompanied by pronounced symptoms of anxiety and depression, as well as significant economic difficulties under wartime conditions. These findings are critically important for the Ukrainian context, as they clearly demonstrate the bio-psycho-social nature of pain as an experience amplified by environmental stressors and instability in access to healthcare services.

The psychological component of pain is not secondary but structural. International meta-analytic evidence indicates that clinically significant symptoms of depression and anxiety may affect up to approximately 40% of individuals with chronic pain, forming a comorbid pattern that complicates treatment, reduces adherence to rehabilitation programmes, and increases the risk of pain chronification. In clinical practice, this is manifested through pain catastrophizing, fear of movement (kinesiophobia), hypervigilance to bodily sensations, sleep disturbances, and avoidance behaviours, all of which contribute to a self-perpetuating cycle of pain, reduced activity, and social withdrawal. In the Ukrainian context, these mechanisms are often further intensified by exposure to traumatic events, prolonged air-raid alerts, insufficient rest, professional burnout, and compassion fatigue among individuals bearing substantial caregiving responsibilities. An additional dimension of relevance concerns rehabilitation. Research addressing the rehabilitation needs of Ukraine's healthcare system in wartime highlights significant structural gaps and urgent requirements related to strengthening rehabilitation infrastructure, improving coordination of care, and integrating psychosocial components into post-injury management. In the context of pain, this implies that effective care cannot be limited to analgesic prescription alone. Instead, it requires clearly defined care trajectories in which pharmacotherapy, physical therapy, occupational therapy, psychotherapeutic

support, and social interventions operate in a coordinated manner toward shared goals of functional recovery. In light of these considerations, a multimodal approach within interdisciplinary care for patients with pain syndrome is regarded as one of the most theoretically grounded and clinically justified directions in contemporary pain medicine and clinical psychology. Its defining feature lies in the integration of interventions with different mechanisms of action and in the organisation of coordinated teamwork involving physicians, rehabilitation specialists, physical therapists, psychologists or psychotherapists, and, when necessary, psychiatrists and social services. Under wartime conditions in Ukraine, this approach acquires strategic importance, as it enables the simultaneous reduction of pain intensity, restoration of functioning, mitigation of psycho-emotional distress and chronification risks, and enhancement of patients' self-management capacities and long-term resilience in an unstable environment.

Therefore, scientific investigation of the clinical and psychological aspects of implementing a multimodal approach in Ukraine is highly relevant from the perspectives of evidence-based medicine and health psychology, as well as from the standpoint of organising interdisciplinary care in the context of war and the post-war reconstruction of the rehabilitation system.

The aim of the article is to provide a scientific substantiation of the clinical and psychological foundations for implementing a multimodal approach in the interdisciplinary care of patients with pain syndrome, as well as to identify key mechanisms for integrating medical, rehabilitation, and psychotherapeutic interventions within the wartime and post-war context of Ukraine in order to enhance treatment effectiveness, prevent pain chronification, and promote functional recovery.

Contemporary research on pain syndrome increasingly departs from reductionist biomedical explanations and adopts a biopsychosocial perspective, within which pain is understood as a dynamic phenomenon emerging from the interaction of neurobiological processes, psychological mechanisms, and social context. This paradigm shift has been conceptually substantiated in the works of Gatchel R. J., Peng Y. B., Peters M. L., and others, who demonstrated that clinical outcomes in chronic pain cannot be adequately explained by tissue pathology or nociceptive input alone [5]. Instead, they are substantially shaped by cognitive-emotional processes, behavioral responses, and environmental conditions, including access to care and social support. Within this framework, pain is conceptualized as a condition sustained by central nervous system plasticity, affective distress, and learned avoidance behaviors, all of which contribute to disability and reduced quality of life. Among explanatory models addressing pain chronification, the fear-avoidance model has gained particular prominence. Systematically developed by Vlaeyen J. W. S. and Linton S. J., this model posits

that maladaptive cognitive appraisals of pain, such as catastrophizing, lead to fear of movement and bodily activity, heightened vigilance toward somatic sensations, and progressive avoidance behaviors [13; 14]. These processes, in turn, result in physical deconditioning, emotional distress, and long-term functional impairment. Subsequent empirical studies have confirmed that fear-avoidance mechanisms mediate the relationship between pain intensity and disability and serve as robust predictors of unfavorable outcomes regardless of the underlying somatic diagnosis. Consequently, psychological factors are no longer regarded as secondary correlates of pain but as central targets of effective clinical intervention. Building on this theoretical foundation, the concept of Interdisciplinary Multimodal Pain Treatment (IMPT) has emerged as a core strategy in contemporary pain management. IMPT refers to coordinated treatment programs that integrate medical, psychological, and rehabilitative interventions within a unified team-based framework. Research by Turk D. C., Okifuji A., Scascighini L., and others indicates that multimodal programs combining physical therapy, psychotherapeutic interventions—particularly cognitive-behavioral approaches—educational components, and pharmacological support achieve superior outcomes in functional restoration and health-related quality of life compared to unimodal or symptom-focused approaches [9; 11]. Importantly, the effectiveness of IMPT is associated less with absolute reductions in pain intensity and more with improvements in participation, self-efficacy, and patients' capacity for self-management. At the same time, systematic reviews and meta-analyses, including those conducted by Elbers S., Kamper S. J., and van Tulder M., highlight substantial heterogeneity among IMPT programs with regard to duration, intensity, composition of components, and outcome measures [4; 8; 12]. This heterogeneity poses methodological challenges for direct comparison of results and limits the standardization and transferability of multimodal models across healthcare systems. Moreover, the majority of studies focus on distal outcomes – such as pain severity, physical function, or quality of life—while comparatively few investigate the mechanisms underlying observed changes, including reductions in catastrophizing, fear of movement, emotional dysregulation, or sleep disturbances. This gap is notable given that such mechanisms are critical for explaining sustained treatment effects and identifying subgroups of patients most likely to benefit from IMPT.

In parallel, a growing body of literature emphasizes the role of affective comorbidity in chronic pain. Meta-analytic evidence synthesized by Bair M. J., Demyttenaere K., Stubbs B., and colleagues demonstrates a high prevalence of clinically significant anxiety and depressive symptoms among individuals with chronic pain, with consistent associations between emotional distress, poorer treatment response, and reduced adherence to rehabilitation [1; 3; 10]. These findings reinforce the rationale for embedding system-

atic psychological assessment and psychotherapeutic components within pain management programs, particularly in contexts characterized by elevated and sustained stress exposure.

International population-based studies, such as those by Jackson T., demonstrate high prevalence rates of chronic pain and a substantial burden of multi-site pain, confirming the systemic nature of this condition across populations [7]. In Ukraine, these patterns appear to be further intensified by war-related biopsychosocial stressors, although empirical evidence remains comparatively limited. Beyond baseline epidemiological patterns, war-related conditions have introduced powerful biopsychosocial amplifiers of pain, including chronic stress, sleep disruption, loss and bereavement, forced displacement, interruptions in medical care, and economic instability. Empirical evidence from the *Total Pain in Ukraine Study* supports the relevance of a “total pain” framework, demonstrating that physical, psychological, and social dimensions of pain are tightly interconnected and mutually reinforcing in the context of armed conflict [2].

Ukrainian clinical and analytical publications further point to insufficient integration of psychotherapeutic and rehabilitative components in routine pain care, particularly under conditions of limited resources and fragmented service provision. Concurrently, assessments of rehabilitation needs in wartime Ukraine reveal deficits in interdisciplinary coordination and highlight the necessity of care models oriented toward long-term functional recovery rather than isolated treatment of injuries or symptoms [15]. Taken together, the reviewed literature reveals several critical gaps. These include limited attention to the mechanisms of action underlying IMPT, insufficient adaptation of multimodal models to contexts of prolonged stress and unstable access to healthcare, and a scarcity of integrative studies combining clinical and psychological analysis within war-affected and post-conflict settings. Addressing these gaps delineates a clear scientific niche for research aimed at conceptualizing and adapting multimodal interdisciplinary approaches to pain management in Ukraine, with implications for both clinical effectiveness and health system resilience.

To address the aim of the study and ensure methodological feasibility under real-world clinical conditions, the research was designed as a prospective single-group study with repeated measurements (pre–post design), focusing on the assessment of clinical and psychological changes in patients with chronic musculoskeletal pain following participation in a structured multimodal interdisciplinary program. This design was selected to allow for a comprehensive examination of patient-level dynamics in response to an integrated intervention combining medical, rehabilitative, and psychological components. It is methodologically appropriate for evaluating complex, non-pharmacological treatment models and is particularly justified in contexts where rand-

omized controlled trials may be difficult to implement due to ethical, organizational, or resource-related constraints. In the current study, these considerations were especially relevant given the limited resources and unstable access to medical and rehabilitation services characteristic of the wartime context in Ukraine.

From a theoretical perspective, the chosen design aligns with the biopsychosocial model of pain, which conceptualizes chronic pain not merely as a sensory phenomenon but as a condition sustained by interacting biological, psychological, and behavioral mechanisms. Accordingly, the study was not limited to the assessment of symptom reduction but was explicitly oriented toward the analysis of psychological processes associated with pain chronification, including maladaptive cognitive appraisals, fear-related avoidance behaviors, emotional distress, and diminished pain self-efficacy. This approach enabled a more nuanced understanding of treatment effects beyond changes in pain intensity alone. The pre–post design further allowed for the evaluation of the practical feasibility and clinical acceptability of a multimodal interdisciplinary model within routine care settings. By capturing changes at the individual level over time, the study provides empirically grounded insight into how such an intervention may function under real clinical conditions and informs considerations related to its potential implementation and scaling within the healthcare system. Outcome assessment was conducted at two clearly defined time points. Baseline assessment (T1) was carried out prior to the initiation of the program and served as a reference point for all subsequent comparisons. Post-intervention assessment (T2) took place immediately after completion of the eight-week multimodal program and reflected short-term changes associated with participation in the intervention. This repeated-measures framework enabled reliable analysis of within-subject changes and formed the empirical basis for evaluating the clinical and psychological effectiveness of the proposed multimodal approach.

The study sample consisted of 68 patients diagnosed with chronic non-specific musculoskeletal pain localized in the lower back, cervical region, or major joints, with a duration exceeding three months. Participants were recruited from outpatient and rehabilitation departments where they sought medical or rehabilitative care. To reduce age-related heterogeneity in pain mechanisms, functional capacity, and treatment response, only individuals aged 25 to 60 years were included. This age range was selected to represent the economically active adult population most frequently affected by chronic musculoskeletal pain while minimizing variability associated with early developmental factors in younger adults and degenerative comorbidities more prevalent in older populations. Inclusion criteria comprised: (1) age between 25 and 60 years; (2) presence of chronic non-specific musculoskeletal pain persisting for more than 12 weeks; (3) stable somatic condition without acute medical deterioration; (4) sufficient cognitive and communicative capacity to

complete standardized questionnaires and actively participate in structured group-based sessions; and (5) provision of written informed consent prior to enrollment.

Exclusion criteria were defined to ensure clinical stability and methodological consistency. Participants were excluded if they presented with severe psychiatric disorders (including psychotic disorders or clinically significant cognitive impairment), acute traumatic injury, current postoperative recovery phase, or active substance use disorder. These criteria were applied to reduce potential confounding effects and to ensure that all participants could safely engage in the multimodal interdisciplinary intervention.

The multimodal interdisciplinary program was implemented over a period of eight weeks and was grounded in the biopsychosocial model of pain and contemporary principles of interdisciplinary care. The program was designed to address chronic musculoskeletal pain through the coordinated integration of medical, physical, and psychological interventions, targeting both symptom expression and underlying mechanisms of pain chronification.

The first component involved medical supervision, including an initial comprehensive clinical assessment and follow-up consultations conducted by a physician. Pharmacological treatment was reviewed and adjusted according to the individual clinical status of each participant, with a deliberate emphasis on optimizing rather than intensifying medication use. The medical strategy prioritized minimizing unnecessary pharmacological burden while supporting functional activity and participation, in line with current recommendations for chronic pain management.

The second component consisted of physical therapy, delivered through individually tailored sessions with a certified physical therapist twice per week. Physical interventions focused on restoring mobility, gradually increasing physical activity, and addressing pain-related fear of movement. Exercise progression and activity goals were adapted to individual capabilities and coordinated with the psychological module to ensure consistency between physical exposure, cognitive reframing, and behavioral activation.

The third component comprised a structured psychological module, delivered in the format of six group sessions lasting 90 minutes each. This module integrated evidence-based psychological strategies commonly used in chronic pain treatment. Core elements included psychoeducation on the neurophysiological and psychological mechanisms of chronic pain, targeted work with pain catastrophizing and maladaptive pain-related beliefs, development of emotional regulation skills, and the application of techniques aimed at reducing anxiety and physiological tension. Particular emphasis was placed on strengthening pain self-management skills and enhancing pain-related self-efficacy, thereby supporting patients' active engagement in their recovery process.

A defining principle of the program was the systematic coordination between disciplines, ensured

through regular communication among healthcare professionals and alignment of therapeutic goals across components. Rather than focusing exclusively on pain intensity reduction, the program adopted a functional orientation, prioritizing improvements in daily functioning, activity tolerance, and patients' capacity to manage pain within everyday life. This integrative and function-centered approach reflects contemporary standards in multimodal pain treatment and enhances the clinical relevance and applicability of the intervention in real-world healthcare settings.

Outcome assessment was conducted using a set of standardized clinical and psychological instruments selected for their established validity, reliability, and widespread use in chronic pain research, as well as for their capacity to capture key mechanisms involved in pain chronification within a biopsychosocial framework.

Clinical pain outcomes were assessed using the Visual Analogue Scale (VAS) and the Brief Pain Inventory (BPI). The VAS was employed as a unidimensional measure of pain intensity, providing a sensitive index of subjective pain severity. The BPI was used to assess both pain intensity and pain-related interference with daily functioning, thereby allowing for a more comprehensive evaluation of the functional impact of pain beyond symptom severity alone. Psychological outcomes were assessed using four validated self-report measures targeting core cognitive, emotional, and behavioral mechanisms implicated in chronic pain. The Pain Catastrophizing Scale (PCS) was used to evaluate maladaptive cognitive responses to pain, including rumination, magnification, and helplessness. The Tampa Scale of Kinesiophobia (TSK) assessed fear of movement and pain-related avoidance, a central construct within the fear-avoidance model of pain. Emotional distress was measured using the Hospital Anxiety and Depression Scale (HADS), which allows for the assessment of anxiety and depressive symptoms while minimizing confounding by somatic symptomatology. Finally, the Pain Self-Efficacy Questionnaire (PSEQ) was administered to evaluate patients' perceived ability to manage pain and maintain functional activity despite pain, reflecting an important protective factor associated with adaptive pain coping and long-term outcomes.

The selection of these instruments was theoretically informed and aimed at capturing not only changes in pain intensity but also modifications in psychological processes that sustain chronic pain, such as catastrophizing, fear-related avoidance, emotional distress, and reduced self-efficacy. Together, this assessment battery enabled an integrated evaluation of clinical outcomes and underlying mechanisms of change associated with participation in the multimodal interdisciplinary program.

Statistical analysis was performed using standard parametric methods appropriate for repeated-measures designs. Descriptive statistics were calculated for all variables at baseline and post-intervention.

Changes in clinical and psychological outcomes from pre- to post-intervention were analyzed using paired-sample t-tests, allowing for the examination of within-subject differences over time. To complement statistical significance testing and provide an estimate of the magnitude of observed effects, effect sizes were calculated using Cohen's *d*, facilitating interpretation of clinical relevance. In addition, correlational analyses were conducted to explore associations between changes in psychological variables and changes in clinical pain outcomes, with the aim of identifying potential relationships between modifications in pain-related cognitions, emotions, and behaviors and improvements in pain intensity and functional interference. The threshold for statistical significance was set at  $p < 0.05$  for all analyses.

This analytic strategy was chosen to balance methodological rigor with feasibility and interpretability, ensuring that both symptom-level changes and psychologically meaningful processes underlying treatment effects could be examined within the constraints of a real-world clinical study design.

The results demonstrated statistically and clinically meaningful improvements across all assessed clinical and psychological domains following completion of the eight-week multimodal interdisciplinary program. Baseline (T1) scores indicated moderate to high pain intensity, substantial pain-related interference with daily functioning, and elevated levels of psychological risk factors associated with pain chronification, including catastrophizing, fear of movement, and emotional distress. Post-intervention (T2) assessments revealed a consistent shift toward improved functional status and more adaptive psychological functioning.

Mean values at baseline and post-intervention, together with results of paired statistical comparisons and effect size estimates, are presented in Table 1.

Pain intensity, as measured by the VAS, decreased by an average of 2.5 points, exceeding the commonly accepted minimal clinically important difference (MCID  $\geq 2$  points). This indicates that the observed reduction represents a clinically meaningful improvement, rather than a statistically trivial change. In parallel, pain-related interference with daily functioning (BPI) decreased by 2.1 points, suggesting substantial gains in functional capacity and everyday participation—outcomes increasingly emphasized as primary targets in chronic pain management.

Effect sizes for clinical outcomes were in the medium-to-large range ( $d = 0.78\text{--}0.89$ ), consistent with or exceeding those reported in international studies of multimodal pain treatment. These findings support the practical effectiveness of the intervention under real-world clinical conditions.

The most pronounced psychological change was observed in pain catastrophizing (PCS), with a mean reduction of 9.5 points and a large effect size ( $d = 0.86$ ). This shift corresponds to a transition from clinically elevated catastrophizing toward a more moderate level. Clinically, this change reflects a reduced tendency to interpret pain as overwhelming,

**Changes in clinical and psychological outcomes following the 8-week multimodal interdisciplinary program (n = 68)**

Measure	Baseline (M ± SD)	Post-intervention (M ± SD)	Mean change (Δ)	t (df = 67)	p	95% CI for Δ	Cohen's d
VAS – Pain intensity	6.8 ± 1.4	4.3 ± 1.6	-2.5	9.12	< .001	-3.05 to -1.95	0.89
BPI – Pain interference	6.1 ± 1.5	4.0 ± 1.4	-2.1	8.27	< .001	-2.62 to -1.58	0.78
PCS – Catastrophizing	28.4 ± 7.6	18.9 ± 6.8	-9.5	8.94	< .001	-11.6 to -7.4	0.86
TSK – Kinesiophobia	39.7 ± 6.9	32.1 ± 6.3	-7.6	7.85	< .001	-9.5 to -5.7	0.72
HADS-A – Anxiety	10.2 ± 3.4	7.1 ± 3.1	-3.1	6.94	< .001	-4.0 to -2.2	0.63
HADS-D – Depression	9.4 ± 3.2	6.8 ± 3.0	-2.6	6.11	< .001	-3.4 to -1.8	0.58
PSEQ – Pain self-efficacy	31.6 ± 8.1	41.2 ± 7.5	+9.6	-8.76	< .001	7.5 to 11.7	0.84

Note. VAS = Visual Analogue Scale; BPI = Brief Pain Inventory; PCS = Pain Catastrophizing Scale; TSK = Tampa Scale of Kinesiophobia; HADS-A/D = Hospital Anxiety and Depression Scale (Anxiety/Depression subscales); PSEQ = Pain Self-Efficacy Questionnaire. Negative Δ values indicate symptom reduction; positive Δ values indicate improvement. Cohen's d values of 0.50, 0.80, and above are conventionally interpreted as medium and large effects, respectively.

uncontrollable, or threatening, and suggests improved cognitive flexibility in pain appraisal.

A significant reduction in fear of movement (TSK) further indicates attenuation of avoidance-based behavioral patterns. This change is particularly relevant within the fear-avoidance framework, as decreased kinesiophobia facilitates engagement in physical activity and supports functional restoration when combined with graded physical therapy. Emotional distress, assessed via HADS, also showed significant improvement. Both anxiety and depressive symptoms decreased from subclinical or borderline clinical levels toward values closer to the normative range. These changes suggest that the psychological component of the program effectively addressed the emotional burden commonly associated with chronic musculoskeletal pain. Of particular importance, pain self-efficacy (PSEQ) increased substantially, with a mean gain of 9.6 points and a large effect size ( $d = 0.84$ ). This finding indicates a meaningful shift toward greater confidence in managing pain and maintaining activity despite discomfort—an outcome strongly associated with sustained functional improvement and long-term adaptation.

Correlational analyses of change scores revealed systematic relationships between psychological and clinical improvements. Reductions in catastrophizing were moderately associated with decreases in pain intensity ( $r = .46, p < .01$ ) and more strongly associated with reductions in pain interference ( $r = .52, p < .01$ ). Similar patterns were observed for reductions in kinesiophobia, which correlated with functional improvement. The strongest association emerged between increases in pain self-efficacy and reductions in pain interference ( $r = -.58, p < .001$ ), underscoring the central role of self-efficacy as a potential mediator of functional recovery. These findings support the

interpretation that clinical improvements were not solely symptom-driven but were closely linked to changes in cognitive and behavioral processes targeted by the multimodal intervention.

Taken together, the findings demonstrate that the multimodal interdisciplinary program was associated with broad and coherent improvements across symptom severity, functional outcomes, and psychological mechanisms of pain chronification. The convergence of statistically robust effects, clinically meaningful changes, and theoretically consistent psychological shifts provides strong support for the effectiveness and clinical relevance of this approach in patients with chronic musculoskeletal pain.

The findings of this study provide empirical support for the clinical and psychological effectiveness of a multimodal interdisciplinary approach in the management of chronic musculoskeletal pain, demonstrating that meaningful reductions in pain intensity and functional interference are accompanied by systematic changes in key psychological mechanisms of pain chronification, including catastrophizing, fear of movement, emotional distress, and pain self-efficacy. The integrated nature of the intervention, grounded in the biopsychosocial model of pain, allowed for simultaneous symptom reduction and functional recovery, highlighting the importance of coordinated medical, physical, and psychological care in real-world clinical settings. From a broader perspective, these results underscore the relevance of multimodal pain treatment in contexts characterized by prolonged stress and limited healthcare resources, such as the current Ukrainian setting. Future research should extend these findings through controlled and longitudinal designs, explore the durability of treatment effects over longer follow-up periods, and examine mediating and moderating factors—such as

self-efficacy and pain-related beliefs—to refine and optimize multimodal interventions for diverse patient populations.

#### BIBLIOGRAPHY:

1. Bair M. J., Robinson R. L., Katon W., Kroenke K. Depression and pain comorbidity: a literature review. *Archives of Internal Medicine*. 2003. Vol. 163, No. 20. P. 2433–2445. DOI: <https://doi.org/10.1001/archinte.163.20.2433>.
2. Burmistr I., Zaslansky R., Dmytriiev D., Kopf A. The Total Pain in Ukraine Study: How Does War Affect Civilians With a History of Chronic Pain? An Observational Study. *European Journal of Pain*. 2026. Vol. 30, No. 1. P. e70185. DOI: <https://doi.org/10.1002/ejp.70185>.
3. Demyttenaere K., Bruffaerts R., Lee S., et al. Mental disorders among persons with chronic back or neck pain: results from the World Mental Health Surveys. *Pain*. 2007. Vol. 129, No. 3. P. 332–342. DOI: <https://doi.org/10.1016/j.pain.2007.01.022>.
4. Elbers S., Geenen R., Huijnen I. P. J., et al. Longitudinal outcome evaluations of interdisciplinary multimodal pain treatment programmes for patients with chronic primary musculoskeletal pain: a systematic review and meta-analysis. *European Journal of Pain*. 2022. Vol. 26, No. 2. P. 310–335. DOI: <https://doi.org/10.1002/ejp.1875>.
5. Gatchel R. J., Peng Y. B., Peters M. L., Fuchs P. N., Turk D. C. The biopsychosocial approach to chronic pain: scientific advances and future directions. *Psychological Bulletin*. 2007. Vol. 133, No. 4. P. 581–624. DOI: <https://doi.org/10.1037/0033-2909.133.4.581>.
6. GBD 2021 Low Back Pain Collaborators. Global, regional, and national burden of low back pain, 1990–2020, its attributable risk factors, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. *The Lancet Rheumatology*. 2023. Vol. 5, No. 6. P. e316–e329. DOI: [https://doi.org/10.1016/S2665-9913\(23\)00098-X](https://doi.org/10.1016/S2665-9913(23)00098-X).
7. Jackson T., Chen H., Iezzi T., Yee M., Chen F. Prevalence and correlates of chronic pain in a random population study of adults in Chongqing, China. *Clinical Journal of Pain*. 2014. Vol. 30, No. 4. P. 346–352. DOI: <https://doi.org/10.1097/AJP.0b013e31829ea1e3>.
8. Kamper S. J., Apeldoorn A. T., Chiarotto A., et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain. *Cochrane Database of Systematic Reviews*. 2014. Issue 9. CD000963. DOI: <https://doi.org/10.1002/14651858.CD000963.pub3>.
9. Scascighini L., Toma V., Dober-Spielmann S., Sprott H. Multidisciplinary treatment for chronic pain: a systematic review of interventions and outcomes. *Rheumatology*. 2008. Vol. 47, No. 5. P. 670–678. DOI: <https://doi.org/10.1093/rheumatology/ken021>.
10. Stubbs B., Aluko Y., Myint P. K., Smith T. O. Prevalence of depressive symptoms and anxiety in osteoarthritis: a systematic review and meta-analysis. *Age and Ageing*. 2016. Vol. 45, No. 2. P. 228–235. DOI: <https://doi.org/10.1093/ageing/afw001>.
11. Turk D. C., Okifuji A. Pain terms and taxonomies of pain. In: *Bonica's Management of Pain*. 4th ed. Philadelphia: Lippincott Williams & Wilkins, 2010. P. 13–23.
12. van Tulder M., Koes B., Bombardier C. Low back pain. *Best Practice & Research Clinical Rheumatology*. 2002. Vol. 16, No. 5. P. 761–775. DOI: <https://doi.org/10.1053/berh.2002.0267>.
13. Vlaeyen J. W. S., Linton S. J. Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. *Pain*. 2000. Vol. 85, No. 3. P. 317–332. DOI: [https://doi.org/10.1016/S0304-3959\(99\)00242-0](https://doi.org/10.1016/S0304-3959(99)00242-0).
14. Vlaeyen J. W. S., Linton S. J. Fear-avoidance model of chronic musculoskeletal pain: 12 years on. *Pain*. 2012. Vol. 153, No. 6. P. 1144–1147. DOI: <https://doi.org/10.1016/j.pain.2011.12.009>.
15. World Health Organization. WHO guideline for non-surgical management of chronic primary low back pain in adults in primary and community care settings. Geneva : World Health Organization, 2023.

*Дата першого надходження статті до видання: 10.03.2026*

*Дата прийняття статті до друку після рецензування: 06.04.2026*

*Дата публікації (оприлюднення) статті: 25.05.2026*