

Comparative Effectiveness of Yoga Therapy, McKenzie Exercises, and Core Stability Training on Disability and Job Satisfaction in Individuals with Mechanical Low Back Pain

R. Rajesh Kumar¹, Dr. S. Natarajan², Dr. C. V. Jayanthi³

Vels Institute of Science, Technology & Advanced Studies (VISTAS), Chennai

DOI: <https://doi.org/10.51584/IJRIAS.2025.101000008>

Received: 06 October 2025; Accepted: 12 October 2025; Published: 27 October 2025

ABSTRACT

Background: Low back pain (LBP) affects nearly 80% of adults worldwide and is a major cause of disability, reduced job satisfaction, and economic burden. Mechanical low back pain, often associated with degenerative changes or disc prolapse, requires effective therapeutic strategies. Conventional physiotherapy and McKenzie exercises are widely used, while yoga therapy has recently emerged as a promising complementary approach focusing on both physical and psychological outcomes.

Objective: To compare the effectiveness of yoga therapy practices, McKenzie exercises, and core stability exercises on disability and job satisfaction levels in subjects with mechanical low back pain.

Methods: Ninety male participants with chronic mechanical low back pain were randomized into three groups: Group A (yoga therapy), Group B (McKenzie and core stability exercises), and Group C (control). The intervention lasted several weeks with structured sessions. Disability was assessed using the Oswestry Disability Index (ODI), while job satisfaction was measured using the Job Satisfaction Scale (Bubey, Uppal & Verma, 1989). Data were analyzed using ANOVA and Scheffé's post hoc tests.

Results: At baseline, no significant differences were observed among groups ($F = 1.47$, $p > 0.05$). Post-intervention, significant differences emerged in both disability ($F = 196.69$, $p < 0.05$) and job satisfaction ($F = 9.44$, $p < 0.05$). Adjusted post-test means indicated that yoga therapy (Group A: 41.02) showed greater improvement in reducing disability compared to McKenzie/core stability exercises (Group B: 46.23) and control (Group C: 76.22). Similarly, job satisfaction improved significantly in the yoga group (43.83) and McKenzie group (52.39) compared to the control group (68.05), with yoga therapy demonstrating superior effectiveness.

Conclusion: Both yoga therapy and McKenzie exercises are effective in improving disability and job satisfaction among individuals with mechanical low back pain. However, yoga therapy produced greater overall benefits, suggesting its potential as a safe, holistic, and cost-effective intervention. Further large-scale studies are recommended to confirm these findings and to explore associated physiological and psychosocial mechanisms.

Keywords: Yoga therapy, McKenzie exercises, core stability, low back pain, disability, job satisfaction

INTRODUCTION

Low back pain (LBP) is one of the most prevalent musculoskeletal disorders globally, with nearly **80% of adults** experiencing it at some point in their lives. Among these, **mechanical low back pain (MLBP)**—pain arising from structural or functional abnormalities of the lumbar spine without major pathology—constitutes the majority of cases. MLBP not only impairs physical functioning but also contributes significantly to **work absenteeism, reduced job satisfaction, psychological stress, and economic burden** on healthcare systems. The World Health Organization has identified LBP as a leading cause of disability worldwide, highlighting the urgency of effective, sustainable, and holistic treatment strategies.

From a **modern biomedical perspective**, the lumbar spine plays a crucial role in weight bearing, stability, and mobility. Dysfunction in intervertebral discs, facet joints, ligaments, and paraspinal musculature leads to nociceptive activation, reflex inhibition of stabilizing muscles, and altered spinal biomechanics. Chronicity is often sustained by **autonomic imbalance, central sensitization, and poor core stability**. Rehabilitation strategies therefore target pain reduction, spinal mobility, and restoration of muscular support.

From a **traditional yogic perspective**, the spine is the axis of life, governing both **structural integrity and prāṇic flow**. Yogic texts describe the spine as the seat of energy channels (*nāḍīs*) and centers (*cakras*), where disturbances manifest as rigidity, fatigue, and pain. Practices such as **āsana and prāṇāyāma** aim to restore balance in the *prāṇamaya kosha*, harmonizing body and mind while improving physical and psychological resilience.

Several therapeutic modalities have been employed for managing MLBP:

- **Yoga Therapy:** Combines postures, breathing, and relaxation techniques to improve flexibility, strengthen spinal stabilizers, reduce stress, and enhance mind–body awareness. Studies have shown yoga to be effective in reducing disability and improving quality of life in chronic LBP patients.
- **McKenzie Exercises (Mechanical Diagnosis and Therapy):** Focus on repeated spinal movements, particularly extension-based exercises, to centralize symptoms, reduce disc derangements, and empower patients in self-management. It has been widely adopted in physiotherapy for mechanical back pain.
- **Core Stability Training:** Targets deep stabilizers such as the **multifidus and transversus abdominis**, restoring segmental control, preventing micro-instability, and reducing recurrence of pain. It is supported by strong evidence for improving spinal function.

While each of these approaches has demonstrated efficacy individually, there is limited evidence directly comparing their relative effectiveness on both **functional disability** and **occupational outcomes such as job satisfaction**. Considering that MLBP is not only a clinical condition but also a **workplace health concern**, interventions must be evaluated for their holistic impact on both **physical recovery** and **psychological well-being**.

Thus, this study was undertaken to compare the effectiveness of yoga therapy, McKenzie exercises, and core stability training on **disability reduction** and **job satisfaction improvement** in individuals with mechanical low back pain.

Anatomy of the Spine

The **spinal cord** extends from the medulla to approximately the **L1–L2 vertebral level**, transitioning to the **conus medullaris** and **cauda equina**. It is organized into **31 segments** (C1–C8, T1–T12, L1–L5, S1–S5, Co1) with **dorsal (sensory/afferent)** and **ventral (motor/efferent)** roots. Major **ascending tracts** (dorsal columns for proprioception/vibration; spinothalamic for pain/temperature; spinocerebellar for unconscious proprioception) and **descending tracts** (corticospinal for voluntary movement; reticulo-/vestibulo-/rubrospinal for postural control and tone) integrate sensorimotor function. The intermediolateral cell column mediates **autonomic output** (sympathetic T1–L2; parasympathetic S2–S4).

In **mechanical low back pain (MLBP)**, pathology commonly involves the **lumbar motion segment** (disc, facet joints, ligaments, paraspinals) and **nerve roots** (radiculopathy) rather than the cord itself (which ends above). Key neural mechanisms include:

- **Nociceptive input** from annulus fibrosus, facet capsules, and myofascial tissues.
- **Radicular pain** from disc protrusion/foraminal stenosis compressing or inflaming a nerve root.

- **Reflex inhibition** of deep stabilizers (e.g., **multifidus**, **transversus abdominis**), degrading segmental control.
- **Central sensitization** within dorsal horn circuits (enhanced excitability, reduced descending inhibition), sustaining chronic pain.
- **Red-flag neurology**: massive cauda equina compression (rare in MLBP) presents with saddle anesthesia and bladder/bowel dysfunction and needs urgent care.

Functionally, the spinal cord provides **segmental reflexes** (e.g., stretch, flexor withdrawal), **proprioceptive integration** for posture, and **descending pain modulation** (from brainstem/cortical centers). Restoring efficient afferent input and motor control is central to MLBP rehabilitation.

Traditional/Yogic (TRS) View

Yogic science frames the spine as the **axis of prāṇa and consciousness**: the **suṣumṇā nāḍī** (central channel) flanked by **idā** and **piṅgalā**, with **cakras** arrayed along the spinal axis. Smooth prāṇic flow supports clarity of mind and postural ease; obstruction manifests as pain, rigidity, and fatigue. Breath-led practices (**prāṇāyāma**) and mindful **āsana** aim to “**clear the nāḍīs**,” **align the spine**, and **harmonize prāṇa**, which conceptually parallels optimizing neural conduction, autonomic balance, and sensorimotor control.

Why This Matters for Your Comparative Trial

- **Yoga Therapy**: Combines graded spinal mobility, diaphragmatic breathing, and attentional regulation—enhancing **parasympathetic tone**, **descending pain inhibition**, proprioception, and **recruitment of multifidus/TrA**. This addresses central sensitization and motor control deficits that perpetuate MLBP.
- **McKenzie (MDT)**: Directional preference (often **extension**) can **reduce intradiscal pressure**, promote **centralization of radicular symptoms**, and normalize **segmental mechanics**—thereby decreasing nociceptive drive to the cord/roots and improving function.
- **Core Stability Training**: Targets **deep stabilizers** (multifidus, TrA, pelvic floor, diaphragm) to **restore segmental stiffness and feed-forward control**, reducing aberrant micro-motion that triggers nociception and reflex inhibition.

Pathophysiology of Mechanical Low Back Pain

Mechanical low back pain (MLBP) is defined as pain arising from the spinal joints, intervertebral discs, vertebrae, ligaments, and surrounding musculature, without major underlying pathology such as infection, fracture, or malignancy. It is the most common subtype of low back pain and is primarily linked to abnormal loading and dysfunction of the musculoskeletal and neural systems of the lumbar spine.

1. Structural and Biomechanical Factors

- **Intervertebral Disc Degeneration**: The lumbar discs undergo age-related and stress-induced changes, including dehydration, annular tears, and loss of proteoglycans. These changes reduce disc height, impair shock absorption, and increase mechanical stress on the facet joints.
- **Facet Joint Dysfunction**: Increased load transfer to facet joints results in inflammation, cartilage degeneration, and nociceptive stimulation of richly innervated joint capsules, contributing to axial pain.
- **Ligamentous and Muscular Imbalance**: Excessive strain on spinal ligaments and reflex inhibition of stabilizing muscles (e.g., multifidus, transversus abdominis) reduce segmental control, leading to micro-instability and recurrent pain.

- **Abnormal Motion Segment Dynamics:** Repeated flexion, extension, or rotational stress can lead to instability of the functional spinal unit, perpetuating nociception.

2. Neural and Pain Processing Mechanisms

- **Nociception:** Pain is transmitted by mechanoreceptors and nociceptors within discs, facet joints, ligaments, and muscles to the dorsal horn of the spinal cord.
- **Radicular Involvement:** Although MLBP is not primarily neuropathic, disc protrusions or foraminal narrowing may irritate nerve roots, producing referred or radicular pain.
- **Central Sensitization:** Persistent nociceptive input enhances excitability of dorsal horn neurons, lowers pain thresholds, and amplifies pain perception, leading to chronicity.
- **Descending Modulation:** Dysregulation of descending inhibitory pathways from the brainstem contributes to heightened pain perception.

3. Autonomic and Psychosocial Contributions

- **Autonomic Dysregulation:** Increased sympathetic activity associated with chronic pain states alters blood flow, muscle tone, and pain modulation.
- **Psychosocial Factors:** Stress, depression, low job satisfaction, and maladaptive coping strategies interact with biological mechanisms to exacerbate MLBP. This biopsychosocial model explains why disability may persist even after structural healing.

Yoga, McKenzie, and Core Stability Interventions

1. Intervertebral Disc Degeneration & Abnormal Loading

- **Pathophysiology:** Loss of disc hydration and height increases pressure on facet joints and ligaments, leading to pain and stiffness.
- **McKenzie Exercises:** Extension-based and directional preference movements help **reduce intradiscal pressure**, centralize disc protrusion, and improve disc nutrition through repeated loading/unloading cycles.
- **Yoga Therapy:** Gentle spinal mobilizations (Bhujangasana, Shalabhasana, Marjariasana) combined with breathing improve **disc nutrition, spinal alignment, and flexibility**, while reducing compressive forces.
- **Core Stability Training:** Strengthening of deep stabilizers (multifidus, transversus abdominis) restores **segmental stability**, preventing micro-instability that accelerates disc degeneration.

2. Facet Joint Dysfunction & Ligamentous Strain

- **Pathophysiology:** Overloading of facet joints causes inflammation and nociceptive pain, while stretched ligaments contribute to instability.
- **McKenzie Exercises:** Posture correction and directional exercises redistribute loads away from irritated facets, providing symptom relief.
- **Yoga Therapy:** Asanas promote **balanced posture, spinal elongation, and flexibility**, reducing abnormal facet loading and improving ligament elasticity.
- **Core Stability Training:** Stabilizer activation provides **dynamic bracing**, preventing abnormal shear and rotation at the facet joints.

3. Muscle Imbalance & Reflex Inhibition

- **Pathophysiology:** Pain inhibits stabilizing muscles (multifidus, transversus abdominis), leading to compensatory overuse of superficial muscles and poor spinal control.
- **McKenzie Exercises:** By reducing pain and centralizing symptoms, reflex inhibition decreases, allowing reactivation of stabilizers.
- **Yoga Therapy:** Integrated postures (Setu Bandhasana, Tadasana, Shashankasana) improve **muscle balance, endurance, and neuromuscular coordination**, while pranayama reduces tension in hypertonic muscles.
- **Core Stability Training:** Directly targets **deep stabilizers**, retraining them for anticipatory and reactive control, restoring proper load sharing and reducing recurrence of pain.

4. Nociception, Central Sensitization & Pain Processing

- **Pathophysiology:** Chronic nociceptive input from discs, facets, and ligaments enhances dorsal horn excitability and amplifies pain.
- **McKenzie Exercises:** Centralization reduces peripheral nociceptive drive, indirectly lowering central sensitization.
- **Yoga Therapy:** Pranayama and meditation activate **parasympathetic dominance** and modulate **descending pain inhibitory pathways**, reducing central sensitization and pain perception.
- **Core Stability Training:** Improves proprioceptive feedback and spinal control, which **normalizes afferent input** and reduces maladaptive pain signaling.

5. Autonomic Dysregulation & Psychosocial Influences

- **Pathophysiology:** Stress, anxiety, depression, and poor job satisfaction worsen pain perception and disability through sympathetic overactivity and maladaptive coping.
- **McKenzie Exercises:** Encourage **patient self-management** and active participation, improving self-efficacy and confidence in managing pain.
- **Yoga Therapy:** Directly addresses the **biopsychosocial model**, reducing stress and anxiety through pranayama, mindfulness, and relaxation; enhances job satisfaction and quality of life.
- **Core Stability Training:** Improves physical function and movement confidence, indirectly reducing fear-avoidance behavior and occupational stress.

RESULTS OF DISABILITY

The Disability was measured through Oswestry Disability Questionnaire. The Table - 1 shows the variance of Disability among Yogic practices (Group-A), Therapeutic Exercises (Group-B) and Control group (Group-C) of low backache men.

	Group-A	Group-B	Control Group	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F-ratio
Pre Test Mean	72.86	72.20	70.36	Between	100.55	2	50.27	1.47
				Within	2969.23	87	34.12	
Post Test Mean	41.56	46.43	75.46	Between	20158.29	2	10079.14	196.69*
				Within	4458.20	87	51.24	

Adjusted Post Test Mean	41.02	46.23	76.22	Between	20950.3	2	10475.15	246.07*
				Within	3660.99	86	42.56	
Mean Difference	31.30	25.77	5.10					

* Significant at 0.05 level of confidence.

The table value for significance at the 0.05 level of confidence with df (2, 87) and df (2, 86) is 3.10. The obtained F value for the pre-test scores (1.47) was less than the required F value of 3.10, indicating that there was no significant difference between the groups at baseline. This confirms that randomization at the pre-test was effective and that the groups were statistically equivalent.

In contrast, the post-test analysis showed a significant difference between the groups, as the obtained F value (196.69) was greater than the critical F value of 3.10. This demonstrates that the differences between the post-test mean scores of the groups were statistically significant.

Furthermore, when adjusted post-test means were calculated and analyzed, the obtained F value (246.07) exceeded the required F value of 3.10, confirming a significant difference among the groups due to the effects of yogic practices and therapeutic exercises on the clinical variable of disability.

Since significant improvements were observed, the results were further examined using Scheffé's Confidence Interval test. The detailed outcomes of this post hoc analysis are presented in Table 1(A).

MEANS			Mean difference	Required C.I
GROUP-A	GROUP-B	CONTROL		
41.02	46.23			
41.02		76.22	35.19*	
	46.23	76.22	29.98*	4.88

* Significant at 0.05 level of confidence.

The multiple mean comparisons presented in Table 1(A) confirmed significant differences between the adjusted means of the Yogic practices group (Group A) and the control group (Group C), as well as between the Therapeutic Exercises group (Group B) and the control group (Group C). In addition, there was a significant difference between Yogic practices (Group A) and Therapeutic Exercises (Group B).

Table 1(A) displays Scheffé's confidence interval values for disability across the three groups of men with low back pain. The adjusted mean values were 41.02 for Yogic practices (Group A), 46.23 for Therapeutic Exercises (Group B), and 76.22 for the control group (Group C). The mean differences were 5.21 between Yogic practices (Group A) and Therapeutic Exercises (Group B), 35.19 between Yogic practices (Group A) and the control group (Group C), and 29.98 between Therapeutic Exercises (Group B) and the control group (Group C).

Since the required Scheffé's confidence interval for significance at the 0.05 level was 4.88, and all the observed mean differences exceeded this threshold, the results confirm that the differences between the groups were statistically significant.

Job Satisfaction

The Job Satisfaction was measured through Job Satisfaction Scale – Bubey, B.L., Uppal.K.K and Verma S.K. (1989). The Table - 2 shows the variance of Job Satisfaction among Yogic practices (Group-A), Therapeutic Exercises (Group-B) and Control group (Group-C) of low backache men.

	Group-A	Group-B	Control Group	Source of Variance	Sum of Squares	Df	Mean Squares	Obtained F-ratio
Pre Test Mean	64.40	61.30	55.76	Between	1147.62	2	573.81	2.12
				Within	23448.87	87	269.52	

Post Test Mean	47.26	53.10	63.90	Between	4273.36	2	2136.67	9.44*
				Within	19689.27	87	226.31	
Adjusted Post Test Mean	43.83	52.39	68.05	Between	8626.38	2	4313.19	231.76*
				Within	1600.44	86	18.60	
Mean Difference	17.13	8.20	8.13					

* Significant at 0.05 level of confidence.

The table value for significance at the 0.05 level of confidence with df (2, 87) and df (2, 86) is 3.10. The obtained F value for the pre-test scores (2.12) was less than the required F value of 3.10, indicating that there was no significant difference between the groups at baseline. This confirms that randomization at the pre-test stage was effective and that the groups were statistically equivalent.

In the post-test analysis, however, a significant difference was observed between the groups, as the obtained F value (9.44) was greater than the critical F value of 3.10. This finding demonstrates that the differences between the post-test mean scores of the groups were statistically significant.

When adjusted post-test means were calculated and subjected to further statistical testing, the obtained F value (231.76) again exceeded the required F value of 3.10. This confirmed that there was a significant difference among the groups, attributable to the effects of Yogic practices and Therapeutic Exercises on the psychological variable of job satisfaction.

Since significant improvements were identified, the results were further examined using Scheffé's Confidence Interval test. The detailed results of this post hoc analysis are presented in Table 2(A).

MEANS			Mean difference	Required C.I
GROUP-A	GROUP-B	CONTROL		
43.83	52.39		8.55*	3.23
43.83		68.05	24.21*	3.23
	52.39	68.05	15.66*	3.23

* Significant at 0.05 level of confidence.

The multiple mean comparisons presented in Table 2(A) demonstrated that significant differences existed between the adjusted means of Yogic practices (Group A) and the control group (Group C), as well as between Therapeutic Exercises (Group B) and the control group (Group C). Furthermore, a significant difference was also observed between Yogic practices (Group A) and Therapeutic Exercises (Group B).

DISCUSSION ON FINDINGS

The present study aimed to compare the effectiveness of yoga therapy, McKenzie/core stability exercises, and control conditions on disability and job satisfaction among men with mechanical low back pain. Disability was measured using the **Oswestry Disability Questionnaire**, and job satisfaction was assessed using the **Job Satisfaction Scale**.

Disability Outcomes

At baseline, there were no significant differences among the groups, confirming that randomization was effective. However, post-test and adjusted post-test analyses revealed highly significant differences ($F = 196.69$ and $F = 246.07$, respectively; $p < 0.05$). Participants in the yoga therapy group (Group A) demonstrated the greatest reduction in disability scores, followed by the McKenzie/core stability group (Group B), while the control group (Group C) showed minimal improvement. Scheffé's post hoc analysis confirmed significant differences between all three groups, with yoga therapy outperforming both McKenzie/core stability exercises and control. This suggests that yoga therapy may provide a more holistic impact on spinal mobility, pain perception, and psychosocial well-being, in line with earlier studies highlighting the role of yoga in reducing chronic low back pain and disability (e.g., Sherman et al., 2011; Tilbrook et al., 2011).

Job Satisfaction Outcomes

Job satisfaction scores followed a similar trend. Baseline scores were statistically equivalent across groups, but significant post-test and adjusted post-test differences were observed ($F = 9.44$ and $F = 231.76$, respectively; $p < 0.05$). Yoga therapy participants again showed the highest gains in job satisfaction, followed by those in the McKenzie/core stability group, whereas the control group showed the least improvement. Scheffé's analysis confirmed significant intergroup differences, indicating that both yoga and McKenzie/core stability exercises can enhance occupational well-being, but yoga produced more robust improvements. This may be explained by yoga's combined physiological and psychological benefits—reducing pain, enhancing coping strategies, and promoting stress management through relaxation and breath regulation.

Interpretation of Mechanisms

The greater effectiveness of yoga therapy may be attributed to its multidimensional nature. Beyond improving spinal flexibility and core strength, yoga integrates pranayama and mindfulness, which reduce sympathetic arousal, enhance parasympathetic dominance, and modulate pain perception. McKenzie/core stability training, while effective in improving mechanical alignment and muscular stabilization, primarily targets the physical domain. The findings highlight the importance of addressing both physical and psychosocial dimensions of MLBP to optimize functional outcomes and job-related satisfaction.

Limitations and Future Research

This study is not without limitations. The sample size was modest, and the study was limited to men, reducing generalizability. The intervention period was relatively short, and no follow-up data were collected to assess long-term sustainability. Additionally, physiological biomarkers such as inflammatory markers (IL-6, TNF- α) or imaging data were not included. Future research should incorporate larger, gender-diverse samples, longer follow-up durations, and multidimensional outcome measures, including biological markers and workplace productivity indices.

CONCLUSION

This study demonstrated that both yoga therapy and McKenzie/core stability exercises are effective in reducing disability and improving job satisfaction in individuals with mechanical low back pain, with yoga therapy producing superior outcomes. These results emphasize the value of yoga as a **holistic, safe, and cost-effective adjunct to conventional rehabilitation**. Its ability to address both the physical and psychological dimensions of chronic low back pain may explain its greater effectiveness compared to purely biomechanical approaches. Incorporating yoga therapy into workplace health programs and rehabilitation protocols may therefore play an important role in reducing disability, enhancing job satisfaction, and improving overall quality of life among individuals with mechanical low back pain.

REFERENCES

1. Bubey, B. L., Uppal, K. K., & Verma, S. K. (1989). Job satisfaction scale. National Psychological Corporation.
2. Chou, R., Qaseem, A., Snow, V., Casey, D., Cross, J. T., & Shekelle, P. (2007). Diagnosis and treatment of low back pain: A joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Annals of Internal Medicine*, 147(7), 478–491. <https://doi.org/10.7326/0003-4819-147-7-200710020-00006>
3. Massalski, Ł. (2011). System klasyfikacji zespołów bólowych kręgosłupa według metody McKenzie [Classification system of spinal pain syndromes according to McKenzie's method]. *Physiotherapy*, 19(3), 63–71. <https://doi.org/10.2478/v10109-011-0019-y>
4. McKenzie, R., & May, S. (2003). *The lumbar spine: Mechanical diagnosis and therapy* (2nd ed.). Spinal Publications.
5. Sherman, K. J., Cherkin, D. C., Wellman, R. D., Cook, A. J., Hawkes, R. J., Delaney, K., & Deyo, R. A. (2011). A randomized trial comparing yoga, stretching, and a self-care book for chronic low back

-
- pain. Archives of Internal Medicine, 171(22), 2019–2026. <https://doi.org/10.1001/archinternmed.2011.524>
6. Tilbrook, H. E., Cox, H., Hewitt, C. E., Kang'ombe, A. R., Chuang, L. H., Jayakody, S., ... & Torgerson, D. J. (2011). Yoga for chronic low back pain: A randomized trial. *Annals of Internal Medicine*, 155(9), 569–578. <https://doi.org/10.7326/0003-4819-155-9-201111010-00003>
 7. van Middelkoop, M., Rubinstein, S. M., Verhagen, A. P., Ostelo, R. W., Koes, B. W., & van Tulder, M. W. (2010). Exercise therapy for chronic nonspecific low-back pain. *Best Practice & Research Clinical Rheumatology*, 24(2), 193–204. <https://doi.org/10.1016/j.berh.2010.01.002>
 8. WHO. (2023). Low back pain fact sheet. World Health Organization. <https://www.who.int/news-room/fact-sheets/detail/low-back-pain>