

Rehabilitation After Lumbar Fusion
Scientific Paper Summary
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Citation and access

Cheng H, Liu J, Shi L, Hei X. The Rehabilitation-Related Effects on the Fear, Pain, and Disability of Patients With Lumbar Fusion Surgery: A Systematic Review and Meta-Analysis. *Neurospine*. 2023;20(1):278–289.

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Study type

Systematic review and random-effects meta-analysis of 15 randomized controlled trials (RCTs). The authors followed PRISMA reporting guidance and searched seven databases through March 2022.

Population

The review included 1,026 adults after lumbar fusion surgery: 528 participants in rehabilitation groups and 498 controls. Individual trials included adults with degenerative disc disease, spinal stenosis, degenerative or isthmic spondylolisthesis, spondylosis, and related lumbar conditions. Ages, diagnoses, timing after surgery, and treatment duration varied substantially across trials.

Intervention or exposure and comparator

Interventions were grouped into three broad categories:

- Exercise rehabilitation, including progressive back-specific exercise, aerobic training, strength or endurance work, stabilization exercise, mobility, and home programs.
- Psychological rehabilitation, primarily cognitive behavioral therapy (CBT)-related approaches aimed at fear, catastrophizing, coping, and return to activity.
- Multimodal rehabilitation, combining exercise with education, CBT-related support, peer support, case management, or other coordinated components.

Comparators were usual care or another rehabilitation approach. “Usual care” was not identical across studies and could include information, mobilization, exercise guidance, referral to physiotherapy, or a less intensive program.

Outcomes

The primary pooled outcomes were pain-related fear, pain, and self-reported disability. Trials used different scales, so the authors generally reported standardized mean differences (SMDs), expressed as Hedges' g . The review did not establish a single ideal protocol, dose, start date, or progression model.

Plain-English summary

This review asked whether rehabilitation after lumbar fusion helps people feel less afraid of movement, experience less pain, and function better. Across 15 randomized trials, the answer was cautiously encouraging.

CBT-related rehabilitation was associated with lower pain-related fear than usual care. Exercise-based rehabilitation was associated with lower pain scores. Programs that combined exercise with psychological or educational support were associated with modest improvements in pain and disability. However, exercise alone did not clearly improve disability in the pooled analysis because the confidence interval crossed zero.

The most important nuance is that “rehabilitation” was not one uniform treatment. Programs began at very different times, lasted for different periods, and used different combinations of exercise, education, psychological support, and supervision. Several pooled comparisons also had moderate to very high heterogeneity. That means the average result should not be treated as a universal prescription.

The practical message is not that every person should follow the same post-fusion workout. It is that a gradual, individualized rehabilitation process—often addressing both physical capacity and fear of movement—may help. Surgical clearance, symptom monitoring, appropriate progression, and coordination with the medical or rehabilitation team remain essential.

Quantitative key findings

- Pain-related fear: CBT-related rehabilitation versus usual care, SMD -0.56 (95% confidence interval [CI] -0.99 to -0.14); 242 intervention participants and 208 controls; $I^2 = 79\%$. This favored CBT-related rehabilitation, but heterogeneity was considerable.
- Pain: exercise rehabilitation versus usual care, SMD -0.56 (95% CI -0.83 to -0.28); 193 intervention participants and 198 controls; $I^2 = 42\%$. This favored exercise, with moderate heterogeneity.
- Pain: multimodal rehabilitation versus usual care, SMD -0.26 (95% CI -0.51 to -0.01); 256 intervention participants and 231 controls; $I^2 = 45\%$. The effect was small and the confidence interval was close to no effect.

- Disability: exercise rehabilitation versus usual care, SMD -0.63 (95% CI -1.27 to 0.01); 167 intervention participants and 169 controls; $I^2 = 87\%$. Because the CI included zero, this result was not clearly statistically significant despite the reported p value of 0.05.
- Disability: multimodal rehabilitation versus usual care, SMD -0.30 (95% CI -0.48 to -0.13); 274 intervention participants and 253 controls; $I^2 = 0\%$. This favored multimodal rehabilitation with low observed heterogeneity.
- Certainty: the authors reported moderate confidence in the overall effect estimate.
- Clinical importance: the authors cautioned that statistical significance did not necessarily equal a clinically meaningful change; for exercise and pain, more than half of the contributing evidence reported mean differences below 2 points on a 10-point scale.
- Adverse events: adverse events were not pooled as a primary outcome, so the review does not establish comparative safety or complication rates for specific programs.

What the study found

The pooled evidence suggests that different rehabilitation components may influence different outcomes after lumbar fusion: exercise was most consistently associated with pain reduction, CBT-related rehabilitation with lower fear, and multimodal rehabilitation with lower disability. The study does not prove that one specific exercise, intensity, or timeline is best for every fusion patient.

Michael Dilworth's coaching interpretation

From my perspective as a coach and a survivor of two lumbar fusions, this supports a foundation-first process rather than a "just exercise harder" message. Physical strength matters, but fear, confidence, breathing, pacing, and movement quality matter too.

My Last Fusion coaching treats safety and regulation as prerequisites for meaningful progression. I want a client to be able to breathe, recognize symptoms, create appropriate trunk pressure, maintain an organized position, and perform a controlled movement before load or complexity increases. That hierarchy is a coaching framework—not a finding from this paper—but it fits the paper's broader signal that multimodal support can matter.

Coach takeaways

- Treat post-fusion rehabilitation as individualized skill building, not a generic list of "safe" exercises.
- Verify surgical or medical clearance and understand the person's healing stage and restrictions before loading.
- Address fear without dismissing it. Graded exposure, education, and achievable practice can be as important as the exercise selection.

- Start with movements the client can control while breathing normally and monitoring symptoms.
- Progress one major variable at a time: load, range, speed, instability, repetitions, or fatigue.
- Do not promise that exercise will eliminate pain or prevent another surgery. The evidence supports possible average benefits, not guaranteed individual outcomes.
- Track function, confidence, and 24-hour symptom response—not only pain during a session.
- Refer back to a qualified medical professional for new or progressive neurological symptoms, wound concerns, fever, unexplained severe pain, bowel or bladder changes, saddle numbness, or other red flags.

How to explain this to a client

- “The research suggests that the right rehabilitation may help with pain, fear, and daily function after a fusion, but there is no single best routine for everyone.”
- “We will build capacity gradually and pay attention to how you respond during the session and over the next day.”
- “Feeling cautious after surgery is understandable. We can work on confidence and movement skill without pretending that fear or pain is imaginary.”
- “Our job in coaching is not to replace your surgeon or physical therapist. It is to help you practice safe, consistent movement within the boundaries they set.”
- “Progress is more than adding weight. Better breathing, steadier control, more walking tolerance, or less fear can all be meaningful wins.”

Limitations and cautions

- The 15 trials differed in diagnoses, age and sex mix, timing after surgery, program content, dose, follow-up, and usual-care comparison.
- Several pooled outcomes had substantial or considerable heterogeneity, especially fear (I^2 79%) and disability with exercise alone (I^2 87%).
- Sample sizes for individual pooled comparisons were modest.
- Rehabilitation programs were often poorly described, limiting replication.
- The review focused mainly on short-term outcomes; it did not establish durable long-term effects.
- The authors did not perform causal analyses among pain, fear, and disability.
- Publication bias and selective reporting cannot be ruled out.
- Lack of participant blinding is unavoidable in most rehabilitation trials and may influence self-reported outcomes.
- The review’s search ended in March 2022; newer evidence may modify the estimate.
- The review does not identify a universally safe start time or exercise prescription for all fusion procedures.
- Findings apply to the studied lumbar-fusion populations and should not automatically be generalized to cervical fusion, acute neurological compromise, unhealed surgery, or people with different medical risks.

- No individual should use this summary to diagnose a condition, select surgery, or replace personalized medical advice.

Conflicts and funding

The authors reported no conflicts of interest and no specific funding from public, commercial, or nonprofit funding agencies.

Acronym dictionary

- CBT — Cognitive Behavioral Therapy: an approach that helps people examine thoughts, emotions, and behaviors that may affect fear, coping, and activity.
- CI — Confidence Interval: a range showing the uncertainty around an estimated effect.
- I² — I-squared: a statistic describing how much variation across studies may reflect real differences rather than chance.
- ODI — Oswestry Disability Index: a questionnaire commonly used to measure disability related to low-back problems.
- PRISMA — Preferred Reporting Items for Systematic Reviews and Meta-Analyses: a reporting standard for systematic reviews.
- RCT — Randomized Controlled Trial: a study that assigns participants to different groups by chance.
- SMD — Standardized Mean Difference: an effect size used to combine results measured on different scales.
- VAS — Visual Analogue Scale: a scale used to rate pain intensity.

One-sentence bottom line

After lumbar fusion, individualized rehabilitation that combines appropriate exercise with education and support for fear may improve pain and function, but the evidence is variable and does not justify a one-size-fits-all prescription.

References

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Medical-information notice

This document is educational and does not provide diagnosis, treatment, exercise clearance, or individualized medical advice. People who have had spinal surgery should follow the restrictions and guidance of their surgeon and rehabilitation professionals.