

The Impact Of Frailty, Anxiety, And Depression On Clinical Outcome Of Surgery For Degenerative Lumbar Spine In The Elderly – A Systematic Review

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Introduction

The aging population is increasingly affected by degenerative lumbar spinal stenosis (LSS) for which decompressive surgery is the primary treatment. Both frailty and psychological distress may influence postoperative outcomes, yet their impact in older patients remains unclear. This systematic review evaluates the impact of frailty, anxiety, and depression on clinical outcomes following LSS surgery in older patients.

Materials and Methods

Databases (PubMed, MEDLINE, Embase, Web of Science, Cochrane Library, Emcare, and PsycINFO) were searched from inception until October 2024. Studies were included if they evaluated frailty and/or psychological distress prior to treatment in patients ≥65 years undergoing decompressive surgery with or without fusion for degenerative lumbar spinal diseases and reported clinical outcomes, patient satisfaction, or adverse events. Risk of bias was assessed using the Newcastle-Ottawa Scale. Meta-analyses used fixed or random-effects models depending on heterogeneity.

Results

Fourteen studies were included, comprising 1,434 older patients. Frailty prevalence ranged from 16% to 66% and depression prevalence varied from 10% to 36%. Frail patients had significantly worse postoperative functional outcomes, increased odds of major complications (OR 2.50, 95%CI 1.83-3.41), non-home discharge (OR 2.06, 95%CI 1.85-2.29), readmission (OR 1.39, 95%CI 1.08-1.78), and reoperations (OR 1.69, 95%CI 1.13-2.55), although still achieving meaningful improvements and comparable satisfaction rates. Depression and anxiety predominantly affected subjective outcomes and were associated with worse functional outcomes, higher pain scores, and lower satisfaction rates.

Conclusion

Both frailty and psychosocial distress significantly affect postoperative outcomes in older LSS patients, although they influence different domains. Frailty primarily affects perioperative outcomes (complications, length of stay, discharge disposition), while psychological problems mainly affect pain, functional recovery, and satisfaction. Given their bidirectional relationship and complementary prognostic value, both should be systematically assessed preoperatively. These factors can inform but not exclude patients from surgery and enable comprehensive risk stratification and personalized treatment optimization in this vulnerable population.

Author (year)	Key findings
<i>Mental status</i>	
Adogwa et al. (2014)	Subgroup recurrent stenosis: Preoperative depression (measured by ZDS) is independently associated with change in ODI score ($\beta = -1.76, p=0.02$). When comparing the bottom quartile of ZDS scores (least depressed) with the top quartile (most depressed), a 2-fold increase in mean ODI improvement was found ($p=0.001$)
Wang et al. (2023)	Depressed patients had worse postoperative functionality scores (ODI 31.5 ± 22.5) compared to not depressed patients ($21.8 \pm 19.9, p = 0.015$).
<i>Frailty</i>	
Chotai et al. (2022)	Frailty is independently associated with ODI ($\beta= 2.95, 95\%CI 1.43-4.47, p<0.001$).
Cui et al. (2025)	Frail patients had worse baseline ODI scores but were more likely to achieve MCID at 1 year (48% vs. 32%, $p = 0.002$) and 2 years (54% vs. 34%, $p < 0.001$), despite similar mean improvement at 2 years ($p\geq 0.05$).
Sugimoto et al. (2023)	Frail patients had significant worse 1 year social life, walking ability and psychological disorder subscale scores (Kruskal-Wallis, $p=0.001, p=0.002, p=0.050$, respectively), and worse RDQ scores ($p=0.043$) compared to robust patients. Frail patients had worse ZCQ-PF scores yet not significant (1.9 ± 0.8 vs. $1.5\pm0.5, p=0.055$)
Sun et al. (2020)	Postoperative ODI scores were generally worse in frail patients compared with robust patients (SSF: ODI 15.6 ± 10.3 vs 12.0 ± 9.4 , LSF: ODI 22.1 ± 10.7 vs 15.2 ± 11.5) but this did not reach significance.

JOABPEQ: Japanese Orthopaedic Association Back Pain Evaluation Questionnaire, LSF: long-segment fusion, ODI: Oswestry Disability Index, MCID: Minimal Clinical Important Difference, RDQ: Roland-Morris Disability Questionnaire, SSF: Short segment fusion, ZCQ(-PF): Zurich Claudication Questionnaire (-physical function, ZDS: Zung Depression Scale.

Reported Outcomes Functionality and Disability