BASELINE DEFICITS DEFINE ROTATOR CUFF TENDINOPATHY SUBGROUPS WITH DIFFERENT RESPONSES TO AN 8-WEEK RESISTED EXERCISE INTERVENTION.

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Introduction: Clinical practice guidelines recommend resistance exercise for patients with rotator cuff tendinopathy (RCtend).[1] Unfortunately, non-response rates are high,[2,3] suggesting the need to define mechanisms underlying how exercise works and who can benefit from exercise. Neuromuscular factors, tendon tissue, psychological factors, and pain sensitivity play a role in symptom severity in those with RCtend.[4–9] Baseline heterogeneity in these factors may predict patient prognosis, but subgroups within this population remain poorly defined. This study aimed to identify subgroups of patients with rotator cuff tendinopathy based on baseline deficits across multiple domains and to characterize their recovery trajectories during an 8-week resisted exercise intervention.

Methods: Sixty-five participants with rotator cuff tendinopathy underwent baseline assessments of tendon morphology, neuromuscular function, and psychological factors, followed by an 8-week standardized resisted exercise program. K-means clustering identified subgroups, and recovery was assessed using the Penn Shoulder Score (Penn) and Patient Acceptable Symptom State (PASS). Linear mixed-effects and logistic regression models analyzed changes in Penn scores and PASS outcomes over time.

Results & Discussion: Three subgroups were identified: Structure/Neuromuscular-Dominant, Psychological-Dominant, and Mixed-Deficits. The Structure/Neuromuscular-Dominant cluster demonstrated the most significant improvements in Penn scores ($\beta = 8.77$, $p = 0.018$) and PASS outcomes by Week 8. The Psychological-Dominant cluster showed slower recovery trajectories, while the Mixed-Deficits cluster exhibited intermediate outcomes. Improvements in Penn scores exceeded the minimal clinically important difference (MCID) in all subgroups, though the rate and extent of recovery varied.

Significance: Distinct baseline deficits define recovery trajectories in rotator cuff tendinopathy. Tailoring interventions to patient subgroups—addressing psychological barriers or systemic health factors as needed—may enhance treatment outcomes. Future research should validate these findings in larger cohorts and explore biological mechanisms driving recovery.

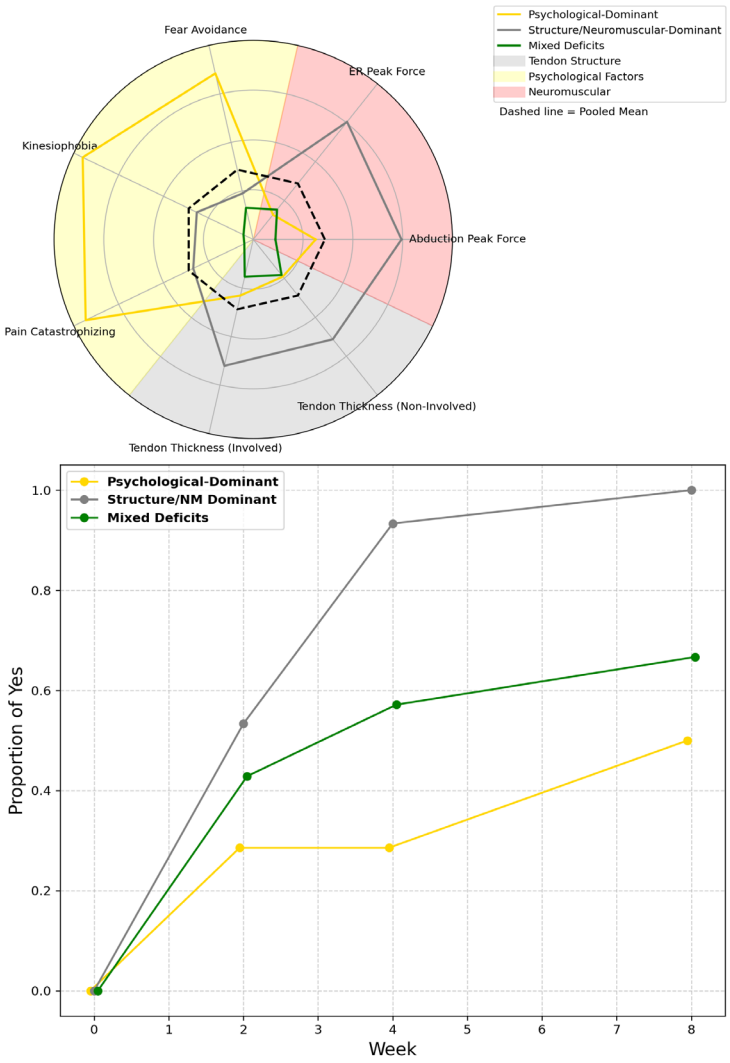

Figure 1:
Top: Baseline characteristics of clusters. The outer circle of the radar graph represents the maximum level of deficit for the corresponding variable. All variables were scaled for comparability, and the direction was reversed for variables where higher values indicate less deficit, ensuring a consistent interpretation across all measures.
Bottom: Predicted PASS trajectories based on data at baseline and weeks 2, 4 and 8.

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