

Pain-related fear affects lifting biomechanics differently in individuals with lifting vs. non-lifting occupations

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Summary

This study investigates the impact of task-specific pain-related fear on lifting biomechanics in 156 healthy adults, comparing those with lifting and non-lifting occupations. The findings suggest that fear-driven protective strategies vary by occupation, emphasizing the need for further research to explore the clinical implications of these biomechanical differences in preventing or managing low back pain (LBP).

Introduction

Fear of lifting an object with a flexed spine has been linked to reduced lumbar flexion and an increased reliance on squatting behavior during lifting tasks in healthy individuals, indicating the adoption of protective movement strategies that may have detrimental long-term effects [1]. However, it remains uncertain whether these biomechanical responses differ between individuals whose occupations involve regular lifting and those in non-lifting occupations. This study examines how task-specific pain-related fear influences lifting biomechanics across these occupational groups.

Methods

The study comprised 156 healthy individuals aged 38.7 ± 11.8 years, including 76 parcel service employees (LIFTER) and 80 individuals with non-lifting occupations such as office workers (NON_LIFTER). All participants completed the Photograph Series of Daily Activities – Short electronic Version (PHODA-SeV) and repeatedly lifted and lowered a 5kg and 15kg box using a freestyle technique. Outcome parameters included the score of the PHODA-SeV item 3 (“lifting a flowerpot with a bent back”), lumbar spine range of motion (ROM; measured with the Epionics SPINE System [2]), and whole-body lifting strategy (assessed with the Stoop-Squat-Index derived from lateral-view video recordings [3]). Statistical analyses were performed using a mixed linear model for each of the two biomechanical outcome parameters. The model's fixed effects included PHODA item 3 as the primary regressor, with within-subject factors Cycle (lifting or lowering) and Condition (5kg or 15kg), between-subject factors Group (LIFTER or NON_LIFTER) and LBP_history (history of LBP or no history of LBP), along with their interactions with PHODA item 3.

Results and Discussion

The linear mixed model for lumbar spine ROM revealed significant interactions between PHODA item 3 and Group ($p=0.039$), Cycle ($p=0.001$), and Condition ($p=0.006$) (Fig. 1). NON_LIFTER showed a significant reduction in lumbar

curvature angle ROM with increased PHODA item 3, while LIFTER did not. The PHODA item 3 showed a significant negative effect during lowering and with the 15kg box, but not during lifting or with the 5kg box. No significant interaction was found between PHODA item 3 and LBP history. The model for the Stoop-Squat-Index indicated no significant interaction effects.

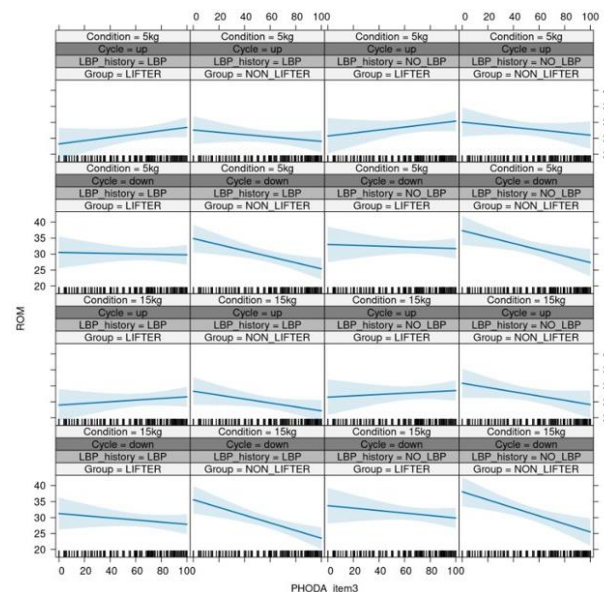


Figure 1: Predictor effect plot for lumbar spine ROM (expressed in degrees) and PHODA item 3 (scores from 0 to 100).

The negative association between task-specific pain-related fear and lumbar spine ROM in NON_LIFTER but not in LIFTER suggests protective movement strategies in those with non-lifting occupations. The fact that the effect was more pronounced during the lowering of heavier loads (15 kg) highlights increased caution with higher perceived risks. The lack of interactions with previous LBP episodes could be due to the absence of chronic conditions in the participants.

Conclusions

These findings contribute to a better understanding of the associations between pain-related fear and lifting biomechanics. Future research should determine its clinical relevance by investigating potential causal relationships between pain-related fear, lifting biomechanics, and LBP.

References

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