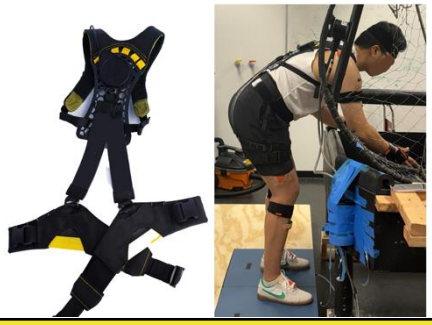
How Can a Back-Support Exoskeleton help Commercial Fishers?

Back-support exoskeletons are wearable devices that provide extra support for the body during work tasks. They are designed to take some of the strain off from back and muscles, which may help reduce fatigue and injuries from heavy or repetitive tasks. In our laboratory-based study, we tested various back-support exoskeletons (shown below) to see how they affect muscle activity, balance, and trunk bending posture during crab harvesting tasks, such as crab sorting and pot handling.

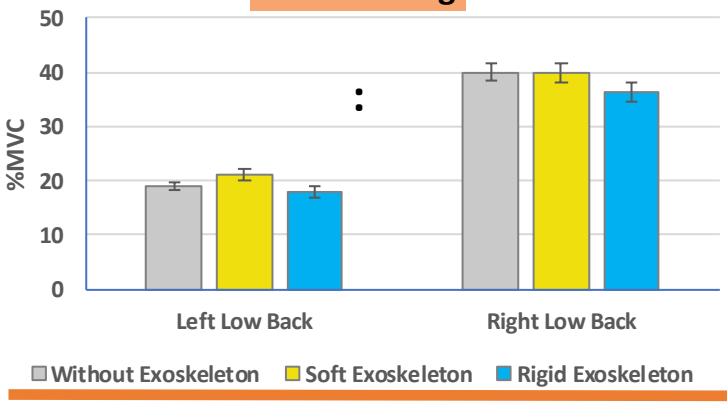


Soft Exoskeleton

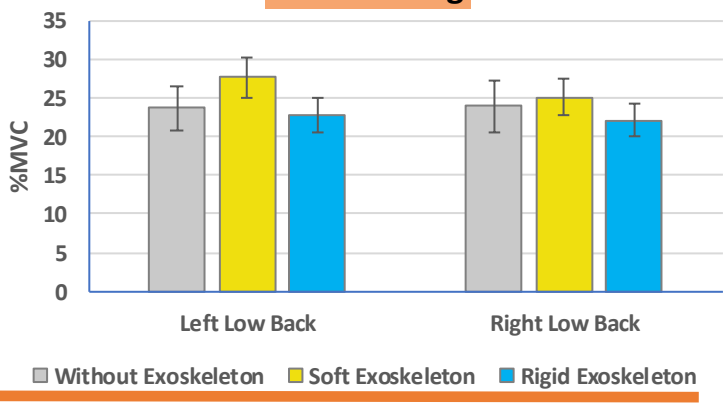
Rigid Exoskeleton

Exoskeletons' impacts on muscle activity: While there is limited evidence of reduced muscle activity (reported as % effort relative to one's muscle strength) in the low back muscles during crab sorting, we observed reductions of up to 3.7 percentage points with rigid exoskeleton use.

Pot Handling

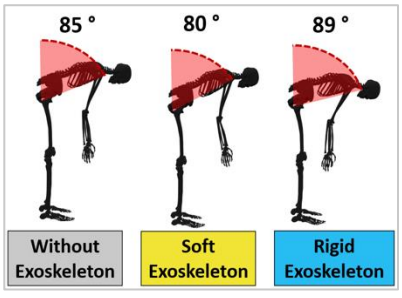


Crab Sorting

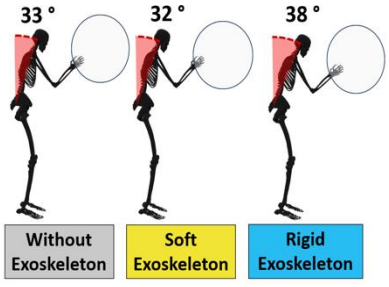


Exoskeletons' impacts on trunk posture: Using exoskeletons during the tasks had a small effect on trunk bending angle, with changes of less than 5° compared to working without them. Overall, exoskeletons were not found to largely change trunk movement during the tasks.

Crab sorting

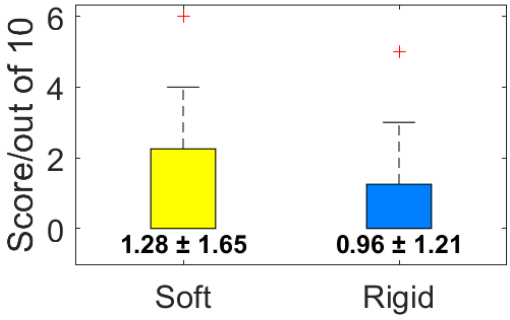


Pot handling



Exoskeletons' impacts on stability: Participants reported low Perceived Balance scores (1.28 for the soft exoskeleton, 0.96 for the rigid exoskeleton, on a 10-point scale), indicating minimal impact on balance.

Perceived Balance Score



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