How an Occupational Exoskeleton Affects Users' Comfort and Physical Exertion

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INTRO:

- Occupational exoskeletons are wearable assistive devices that can support and assist the user's body during physically intensive work (Elprama et al., 2022).
- Safety benefits and possible performance enhancements (Kermavnar et al., 2021) have led organizations to implement this technology, but there is limited research on employees' perceptions of them.
- Previous exoskeleton research has found evidence of reduced exertion and increased discomfort when wearing an exoskeleton, but methodological weaknesses cloud the validity of these findings.

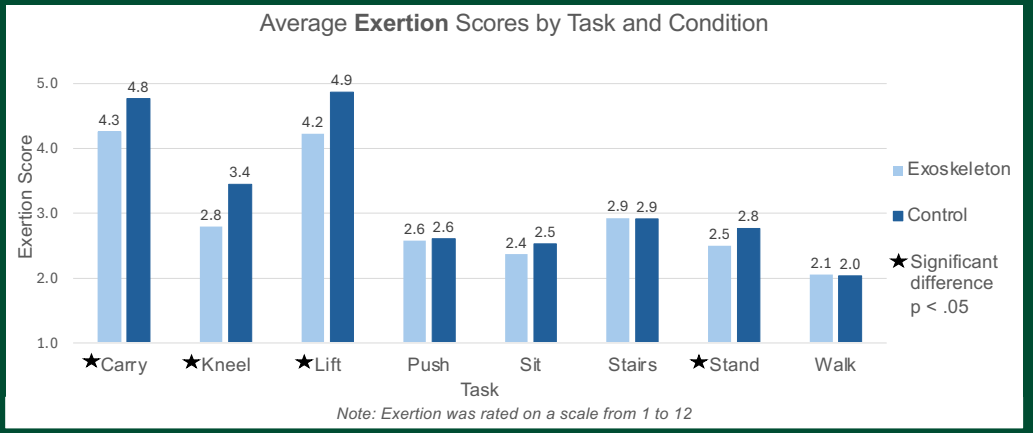
METHODS:

- Within-subjects design with a control (no exo) and exoskeleton condition.
- Participants (N = 90) performed 8 occupational tasks (4 supported, 4 unsupported).
- General comfort measured with one item: What was your comfort level while _____?" (Baltrusch et al., 2018). Rated on a 1 to 5 Likert scale.
- Physical exertion measured with the one item BORG CR-10 scale: Please rate your exertion (i.e., perceived intensity of physical effort) while ___" (Borg, 1990; Giustetto et al., 2021). The category ratio (CR) scale has 12 response options.
- Participants completed each item after every task.

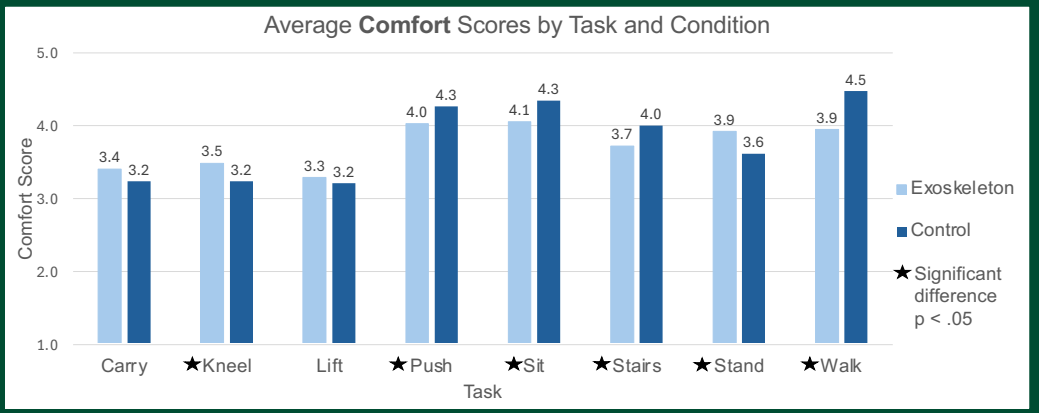
RESULTS:

- Wearing the exo sig. decreased physical exertion in the four tasks it is designed to support.
- Wearing the exo sig. increased comfort in two tasks it is designed to support.
- Wearing the exo sig. decreased comfort in the four tasks it is not designed to support.

Occupational exoskeleton **decreases exertion** but also **decreases comfort** in everyday worker tasks.



Note: Exertion was rated on a scale from 1 to 12



IMPLICATIONS:

- Although exoskeletons are decreasing physiological and psychological exertion, users still feel they are uncomfortable in everyday tasks.
- Exoskeleton designers should continue to re-design the device to minimize discomfort and pressure points.
- Organizations interested in implementing exoskeletons should ensure proper usage training and guidelines for workers to follow to minimize the risk of injury.

FURTHER DIRECTIONS:

- A similar study should be carried out in a field setting with workers who use exoskeletons.
- Exertion and comfort should be evaluated in other types of exoskeletons as well (powered exoskeletons, arm-support exoskeletons, etc.).

If you want to try on an exoskeleton and participate in our study, **scan here!**

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