

Drivers and Barriers to Adopting Passive Exoskeletons in Construction

Understanding the Drivers of and Barriers to Adopting Passive Back- and Arm-support Exoskeletons in Construction

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Overview

Exoskeletons (EXOs), including those providing arm and back support, show potential in mitigating the high rates of work-related musculoskeletal disorders among construction workers. However, the specific benefits and limitations of their use in construction remain unclear, and so this study aimed to identify the drivers for and barriers to adopting exoskeletons in the industry. It used a two-phase approach: an interview study with 24 construction stakeholders and a field study with 22 construction workers. Interviewees had hands-on experience with a range of EXOs and provided feedback on initial impressions, perceived barriers, and potential benefits of EXO use; those responses were analyzed and systematically categorized as positive, neutral, and negative. Field study participants wore passive arm- and back-support EXOs while performing their jobs for up to 1 hour, then completed exit surveys that assessed usability, comfort, safety, and satisfaction.

Key Findings

- The researchers found a generally positive view of exoskeletons in construction, with stakeholders open to adoption for enhancing productivity and reducing physical demands. However, concerns about usability, safety, and social acceptance indicated a need for design improvements based on comfort and compatibility.
- Most of the stakeholders interviewed held positive impressions of arm-support exoskeletons (67%), back-support exoskeletons (75%), and the readiness of exoskeletons for use in construction (60%).
- Many interviewees expressed neutral impressions about peer acceptance of exoskeletons (50%) and the potential impacts of EXOs on safety (58%).
- More than three-quarters of interviewees (79%) had concerns about the exoskeletons getting snagged or caught on objects, potentially leading to safety risks.
- Two-thirds of interviewees expressed the need for training sessions, educational materials, and instructions on the proper use of exoskeletons.
- In the field study, 60% of participants agreed or strongly agreed that the exoskeletons reduced discomfort or pain, in areas like back and shoulders.
- A similar proportion (61%) of field study participants agreed or strongly agreed that exoskeletons reduced their physical effort.
- Future research should include longitudinal studies to track shifts in perceptions and assess diverse EXO designs.

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Read the abstract:

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