

## **Trunk Muscle Use during Pulling Tasks: Effects of a Lifting Belt and Footing Conditions**

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Pulling tasks require the torso to act as a rigid link in order to facilitate the force transmission between the ground and the hands. In this study, we tested the hypothesis that a lifting belt increases the rigidity of the torso, thereby increasing pulling strength or reducing trunk muscle forces, or both, as pulling tasks are performed. Twelve volunteers performed maximal and submaximal isometric pulling exertions; the latter were performed on nonslippery and slippery surfaces. Electromyographic data from 8 trunk muscles, trunk kinematic data, and ground reaction forces were sampled during each exertion. Results indicated that the lifting belt had no effect during maximal exertions on the maximal pull forces generated or the muscle recruitment levels, irrespective of the pulling posture. The lifting belt did not affect the EMG data obtained during the submaximal (40% of maximum) exertions, even when participants pulled on a slippery surface. However, the slippery surface increased the coactivation within the trunk musculature, perhaps stiffening the torso in the event of a slip. The absence of a statistical interaction effect between the lifting belt and the footing condition (slipperiness) indicates that the belt did not alter the coactivation pattern and hence was not relied upon by the participants as a protective mechanism. The data presented here will assist those who must make decisions regarding lifting-belt use and those who train individuals in manual materials handling techniques.