Postural Behaviors during One-Hand Force Exertions

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Posture and external loads such as hand forces have a dominant effect on ergonomic analysis outcomes. Yet, current digital human modeling tools used for proactive ergonomics analysis lack validated models for predicting postures for standing hand-force exertions. To address this need, the effects of hand magnitude and direction on whole-body posture for standing static hand-force exertion tasks were quantified in a motion-capture study of 19 men and women with widely varying body size. The objective of this work was to identify postural behaviors that might be incorporated into a posture-prediction algorithm for standing hand-force tasks. Analysis of one-handed exertions indicates that, when possible, people tend to align their bodies with the direction of force application, converting potential cross-body exertions into sagittal plane exertions. With respect to the hand-force plane, pelvis position is consistent with a postural objective of reducing rotational trunk torques. One-handed task postures are characterized by axial rotation of the torso towards or away from the point of force application.

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