

Postural Stability During Simulated Drywall Lifting and Hanging Tasks C.S. Pan, S. Chiou, D. Long, J. Zwiener and P. Skidmore Division of Safety Research, National Institute for Occupational Safety and Health, 1095 Willowdale Rd., Morgantown, WV 26505

According to the Bureau of Labor Statistics, falls accounted for 32% of traumatic injuries among drywall installers (1992-1995). Falls are significant contributing factors in causing fractures, musculoskeletal injuries, or even fatalities. Drywall lifting and hanging tasks require workers to handle heavy and bulky drywall sheets and maintain awkward postures to install materials onto the wall or ceiling. Previous studies indicated that drywall lifting and hanging tasks cause more fall-related injuries than any other tasks. Activities associated with these two tasks often result in muscle fatigue and propensity for loss of balance. In addition, drywall installers are exposed to high risk of falls since they often work at elevations. The objective of this study is to investigate workers' postural instability while lifting or hanging drywall sheets. Forty-seven construction workers (mean age =  $34.7 \pm 9.1$  years) with at least 6 months of drywall installation experience (mean experience =  $9.1 \pm 6.8$  years) participated in this study. Each subject performed four lifts of a 4 foot by 8 foot drywall sheet using one of the four lifting methods: 1) vertical lift of the drywall; 2) horizontal lift of drywall with both hands positioned on the top of the drywall; 3) horizontal lift of drywall with both hands positioned on the bottom of the drywall; and 4) horizontal lift of drywall with one hand positioned on the top and one positioned on the bottom. The subject was also asked to perform 4 hanging trials using one of the four hanging methods: 1) vertical hanging onto the wall; 2) horizontal hanging onto the wall; 3) vertical hanging onto the ceiling; and 4) horizontal hanging onto the ceiling. This study is a completely randomized design with lifting and hanging methods randomly assigned to each subject. Workers' postural instability was quantified using a piezoelectric type force platform. Two postural sway variables (sway length and sway area) and two indices (Index of Proximity to Stability Boundary (IPSB) and Stability Area Ratio (SAR)) were used to describe workers' propensity for loss of balance associated with drywall lifting and hanging. Analyses of variance showed that the effects of different lifting and hanging methods were significant on the two postural-sway variables (all p values < 0.001) and the two postural instability indices (all p values < 0.002). Horizontal lift of a drywall sheet with both hands positioned on the bottom of the drywall was found to cause significantly greater postural sway and instability than vertical lift or horizontal lift with both hands positioned on the top of the drywall (all p values < 0.01). Postural sway and instability associated with horizontal hanging onto the ceiling were greater than for vertical hanging onto the wall or horizontal hanging onto the wall (all p values < 0.001). All the simulated drywall lifting and hanging tests were performed at the floor level. Workers' postural sway and instability may be more drastic, leading to higher risk and severity of fall, if workers perform drywall lifting and hanging at elevations, such as ladders, scaffolds, and stilts. Results from this study indicate that, to minimize postural instability, workers should avoid lifting drywall sheets in the horizontal position with both hands on the bottom of the sheet. Workers should also avoid horizontal hanging of drywall sheets onto the ceiling (method 4).