

# Abstract

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**THESIS PROJECT:** The Effect of Prefabricated Foot Orthotics on Functional and Postural Stability in Older Adults

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**Background.** Accidental falls comprise a serious health concern in older adults. Partially accounting for the high incidence rates is postural instability. While customized foot orthotics can improve certain measures of functional stability, the purpose of this study was to explore the degree to which prefabricated orthotics benefit this population and to expand the evidence base to postural stability.

**Methods.** Eighteen healthy older adults ( $72.7 \pm 4.8$  years) were evaluated with and without foot orthotics, and again following 2-3 weeks of use. Functional stability was evaluated via the Timed-Up-and-Go test and the Fullerton Advanced Balance scale. Computerized posturography was used to assess stability in altered sensory environments (Sensory Organization Test) and to

assess overall stability limits (Limits of Stability test). A pressure analysis system assessed gait parameters and pressure distribution patterns.

**Results.** Foot orthotics improved stability on the Timed-Up-and-Go ( $p=0.003$ ) and the Fullerton Advanced Balance Scale ( $p<0.001$ ) and decreased fall occurrence on the Sensory Organization Test. Times based changes of postural stability occurred for medio-lateral sway velocity and area when only the vestibular system providing accurate information (condition 5) ( $p=0.001$ ,  $0.05$ , respectively), and under sensory conflict (condition 6) for sway velocity (medio-lateral and antero-posterior), sway path length and sway area ( $p=0.015$ ,  $0.021$ ,  $0.015$ ,  $0.015$ , respectively). An interaction effect was found for maximum excursion composite score ( $p=0.001$ ) on the Limits of Stability test, as well as a main effect of time for directional control in the ML direction and composite score ( $p=0.024$ ,  $0.043$ ). Contact area increase in the midfoot and rearfoot and peak force decreased in the rearfoot ( $p=0.001$ ,  $0.03$ ,  $0.027$ , respectively).

**Conclusions.** Results indicate that foot orthotic use can improve functional measures of stability in older adults. It is unclear whether the time-based changes in postural stability are attributable to the orthotics or are a result of learning effects. Regardless, improvements in stability with prefabricated foot orthotics may help decrease the risk of falls in this population.