Does increased weight alter ankle mechanics and spatial temporal gait mechanics in healthy controls?

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Summary
This study examined the effect of increasing weight on spatial temporal and ankle mechanics in a group of healthy control subjects in order to understand the influence that weight can have on joint motion and joint loading. These results indicate that increased weight can alter both spatial temporal mechanics as well as sagittal plane ankle mechanics.

Introduction
Ankle osteoarthritis (OA) has been associated with severe disability and functional decline in adults has been associated with trauma, increased age, and weight. While these factors are important, it is difficult to assess the independent effects of each due to their inherent interrelationships. One factor of particular interest is the effect of weight on ankle joint loading and the potential changes in walking mechanics that could alter joint loading and therefore potentially decreases the wear on a joint as one ages or following a traumatic injury. The purpose of this study was to examine, during level walking, the relationship between increased weight and gender on ankle kinematics and kinetics.

Methods
Fifty-eight (30 male, 28 female) subjects were recruited for the study. All subjects underwent a standard level walking gait analysis in four different weight conditions (normal, 10%, 15%, and 20% increased weight) Testing order was randomized. Weight could be increased in two pound increments through the use of a vest with pockets. The temporal parameters were normalized to the stance phase of gait, while the spatial parameters were normalized to each subject’s standing height. A series of mixed factor repeated measures ANOVAs (gender x weight) were used to determine statistical significance between the groups (p < 0.05).

Results
Walking speed was not significantly different between genders or the various weights. No statistical interactions were observed. No statistically significant differences existed for step length, step time, stride length and swing time or sagittal and frontal plane ankle kinematics. No significant differences existed for the frontal plane ankle kinetics. A significant increase in plantarflexion moment existed for the males (p

Conclusion
Increasing body weight alters spatial temporal mechanics as well as ankle kinetics in the sagittal plane in a healthy control population. However, the effect of increasing weight appears to be similar between genders. Therefore, it may be relevant for future studies to assess the role of weight as a potential covariate on post-operative outcomes as well as gait mechanics.