INTRODUCTION
Aging is associated with impaired walking performance characterized by such changes as slower preferred walking speed, reduced stability, and more walking related falls. Specifically, adults over the age of 65 years have been shown to consume 15-20% more metabolic energy per kg body mass to walk a given distance than young adults [1, 2]. The reasons for the increased costs of walking in older adults are still unclear.

One factor that may contribute to an increase cost of supporting body weight among older adults is increased fear of falling. Research suggests that older adults with a heightened fear of falling might also use greater antagonist muscle co-activation [3]. The purpose of this study is to determine the metabolic cost for supporting the body’s weight in older adults and its relationship to fear of falling and increased feeling of stability. We hypothesized that older adults would have a greater cost of supporting body weight and an increased fear of falling.

METHODS
Ten healthy young (23 ± 2.0 years) and ten healthy older (76 ± 5.6 years) adults walked on a motorized treadmill at 0.75 m s⁻¹ and 1.25 m s⁻¹ with 0%, 25%, and 50% of body weight support. For each trial, we determined net metabolic cost, lower limb kinematics, and perceived fear of falling.

We provided weight support by applying a nearly constant upward force to the pelvis and torso near the center of mass using a custom built harness and elastic pulley system (fig. 1) as described by Griffin et al.[4].

RESULTS AND DISCUSSION
Weight support reduced the rate of metabolic energy consumption to a greater extent in older adults compared to young adults (P<0.0001; Fig. 2). Weight support decreased metabolic energy consumption more in older adults compared to young adults (P<0.0001).

During all weight support conditions, kinematic analysis revealed that older adults walked with similar stride frequencies (P=.102) and spent a similar portion of the gait cycle in double and single limb support phases as younger adults (P=.340). Across both age groups, all weight supports and speeds, human fall efficacy (P=.293), and perceived fear of falling (P=.393) is similar in young and older adults.

CONCLUSION
The results of our study support our first hypothesis that older adults have a greater cost of generating force to support body weight when compared to young adults. However, our results also show in contrast to our hypothesis that our older subjects had a similar fear of falling as our younger subjects. Together these results suggest that the increased metabolic cost of supporting body weight among older adults is not related to an increased fear of falling. It may still be plausible that the increased cost of walking and even more specifically the cost of supporting body weight in older adults is related to greater levels of antagonist muscle co-activation.

REFERENCES