perturbations were induced by a sudden platform translation to the left or right and anterior-posterior perturbations were induced by a sudden increase or decrease in both belt speeds. The response to the perturbation was measured using full-body motion capture, ground reaction forces and muscle activity of 16 major lower-limb muscles. A generalized linear mixed effect model was used to test the hypothesis by comparing the differences in adjustment in foot placement (i.e. stepping strategy), COP movement (i.e. ankle strategy) and reactive muscle activity between the young and older subjects. Forward simulations with OpenSim gait2392 Model was used to evaluate the effect of reactive muscle activity on foot placement and COP movement. **RESULTS:** Only for a small subset of the perturbations, reactive muscle activity and kinematic strategies differed between young and older subjects. When perturbation magnitude increased, the older adults relied more on a stepping strategy and less on an ankle strategy for inward directed perturbations, given the increase in inward stepping (stride width, figure 1b, $p<0.001$), decreased outward COP movement in the foot (figure 1d, $p=0.01$). In addition, tibialis anterior activity increased less in the older compared to the young subjects. (figure 1c, $p<0.001$). Using simulations, we related tibialis anterior activity to outward movement of the center of pressure in the stance foot and confirmed its contribution to the ankle strategy. Hence, a failure to generate timely and sufficient tibialis anterior activity in the elderly necessitates adjustment of foot placement. **CONCLUSIONS:** We concluded that deficient tibialis anterior activity predisposes elderly to use stepping rather than lateral ankle strategies to control balance. [1] Connor, Journal of Neurophysiology (2009) [2] Reimann, PLoS One, (2017) [3] Hof, Journal of experimental biology. (2010)

O.5.viii Influence of required coefficient of friction on rate of shoe wear

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BACKGROUND AND AIM: Falls resulting from slipping are one of the leading causes of injury. Research has shown that shoes' ability to prevent a slip event degrades over time [1]. Preliminary evidence suggests that shoes do not wear at the same rate for all individuals. Thus, identifying characteristics that predict wear rate for shoes may be useful in individualizing footwear replacement programs. Required coefficient of friction (RCOF), is a measure for how much friction is utilized during walking, and has previously been used as a metric individual risk of slipping [2]. We assert that this metric also predicts the rate at which a shoe is worn down. Specifically, we expect that increased frictional demands during gait are correlated with faster shoe wear. **METHODS:** Eleven subjects completed gait assessments wearing two types of slip-resistant shoes while walking over force plates; peak RCOF was measured for each subject and shoe [3]. Then, subjects wore each pair of shoes in their workplace for one month. At baseline and after the shoes were worn, silicone rubber molds of the heel tread were made. The tread volume of each mold was measured by filling the tread imprints with water and weighing the mass change. The volumetric difference between each month of wear was calculated and normalized to walking

distance as measured by a pedometer attached to the shoes. This parameter was termed wear rate [mm3/km]. Only data for which the subjects walked at least 75 km were included [4]. As such, there were three full data sets that included both types of shoes and six that included only one shoe. Statistical methods consisted of repeated measures ANOVA with incomplete data using maximum likelihood method. This method is suited for repeated measures with incomplete data [5]. The dependent variable, wear rate, was log transformed to achieve normal residuals, and the independent variables were shoe type and peak RCOF. **RESULTS:** Peak RCOF ranged from 0.09 to 0.22. Wear rate was positively correlated with RCOF ($p = 0.0247$) across all shoes and subjects. It should be noted that the trend was largely driven by two subjects with low peak RCOF values and correspondingly low wear rates. **CONCLUSIONS:** This research provides preliminary evidence that an individual's peak RCOF is related to their wear rate. Therefore, peak RCOF may be able to predict individualized shoe replacement schedules. Given the limited number of subjects at present, the results should be monitored as the data set for this study becomes more complete. ACKNOWLEDGEMENTS & **FUNDING:** This work was funded by a grant from the National Institute for Occupational Safety and Health (NIOSH R01 OH 010940) and the National Science Foundation (NSF 16-104). 1. Verma, et al. (2014). Ergo. 2. Beschorner, et al. (2016). Gait & Pos. 3. Chang, et al. (2011). Human Factors. 4. Hemler, et al. (2018). Proc STLE 2019. 5. Gornbein, et al. (1992). Stat methods in Med Res.

O.6 Cognitive, attentional and emotional influences

O.6.i The effects of dual tasking and aging on event related potential (ERP) components of gait cycle

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BACKGROUND AND AIM: Walking in everyday life requires coping with challenging conditions such as dual tasking, and is thus considered to be controlled by higher cognitive processes. The effects of dual tasking on gait and their association with fall risk in older adults have been widely studied. In recent years, evidence linking the changes in gait during dual tasking to changes in brain activation has started to emerge. Electroencephalogram (EEG) is a neuroimaging method that can be useful in investigating brain activity during real, dual task walking. Our aim was to evaluate the effects of dual tasking on the event related potential components of the gait cycle. **METHODS:** 10 healthy young adults (age: 33±6.5yrs; 50% women) and 10 healthy older adults (age: 67.1±5.52yrs; 60% women) walked on a treadmill with audio oddball task (dual task) and

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