P2-N-112

Older adults demonstrate lower joint angle variance than young adults during curb descent, which may reflect less adaptable gait.

Joint angle variance in the bipedal linked chain during curb negotiation

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INTRODUCTION

- Approximately 15% of falls occur during traversing a curb [1,2], with higher number of falls during curb descent [3].
- Heel contact marks the establishment of a new base of support, and the limb must be correctly positioned to ensure safe weight transfer.
- Joint angle variance in the lower limbs at heel contact will inform how the body is controlled during this task, and may provide insights regarding fall risk.

AIM

- The aim of this study is to quantify the joint angle variance in the lower limbs at heel contact during curb ascent and descent.

METHODS

1. Nine young (20.2±2.1 yrs.) and nine older adults (72.2±6.4 yrs.)
2. Two conditions: Stepping up and stepping down a curb
3. Twenty trials for each condition

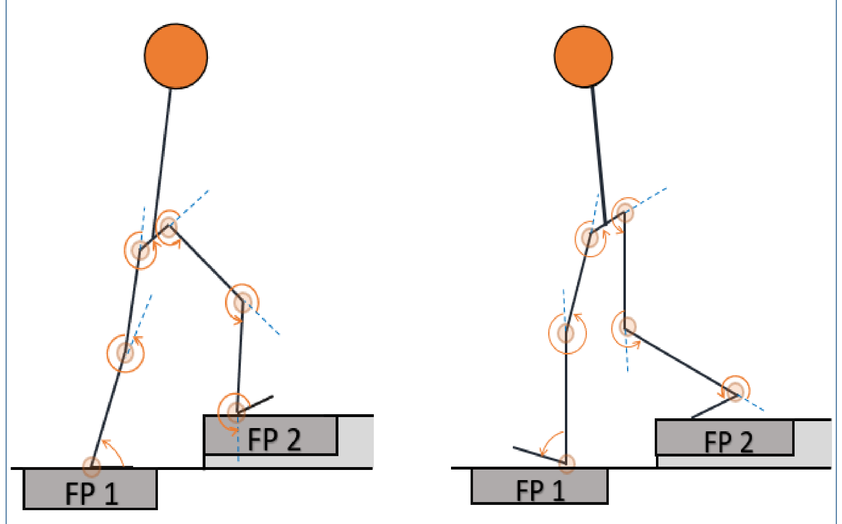

FIGURE 1. Joint angles included during stepping up (left) and stepping down (right) the curb.

RESULTS

TABLE 1. Significant age by condition interaction for joint angle variances.

Joint angle variance	p-value
Total joint angle variance	p<0.01
Sagittal plane	
Frontal plane	
Lead limb	
Trail limb	

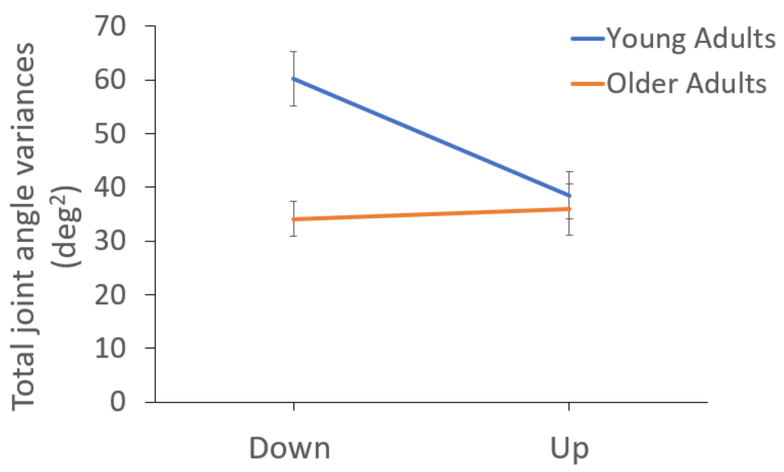

FIGURE 2. Total joint angle variances as a function of age and condition. Similar patterns were observed for joint angle variance in lower-limb in sagittal plane, frontal plane, lead limb and trail limb.

SUMMARY

- Varied solutions to perform a movement offers the flexibility to handle challenging environments. These varied solutions are a major source of variability in movements [4].
- Lower joint angle variance in older adults during stepping down may reflect more stereotypical and less flexible gait [3,4].
- This less flexible gait pattern may restrict their ability to accommodate to the challenging situations, which may in turn increase fall risk in older adults.
- Higher joint angle variance during stepping down in young adults may also reflect an exploratory strategy to gain information about the interaction of the person and the environment.
- Future analyses will identify if synergies exist during these gait tasks, and how these synergies change with age, with uncontrolled manifold analyses.

REFERENCES
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ACKNOWLEDGEMENT
Fulbright Scholar Program
(Dr. Fabio Augusto Barbieri)

PURDUE Motor Behavior Group