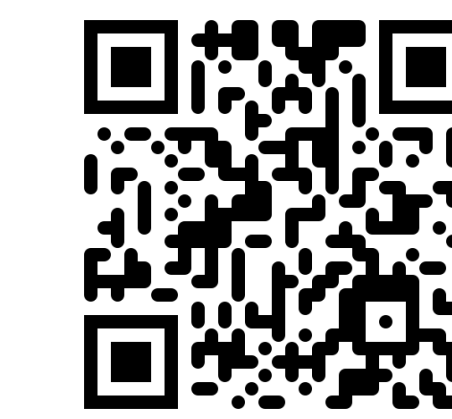


Momenta control during each phase of gait reveals a common strategy

between straight-line gait and 90 degree turns

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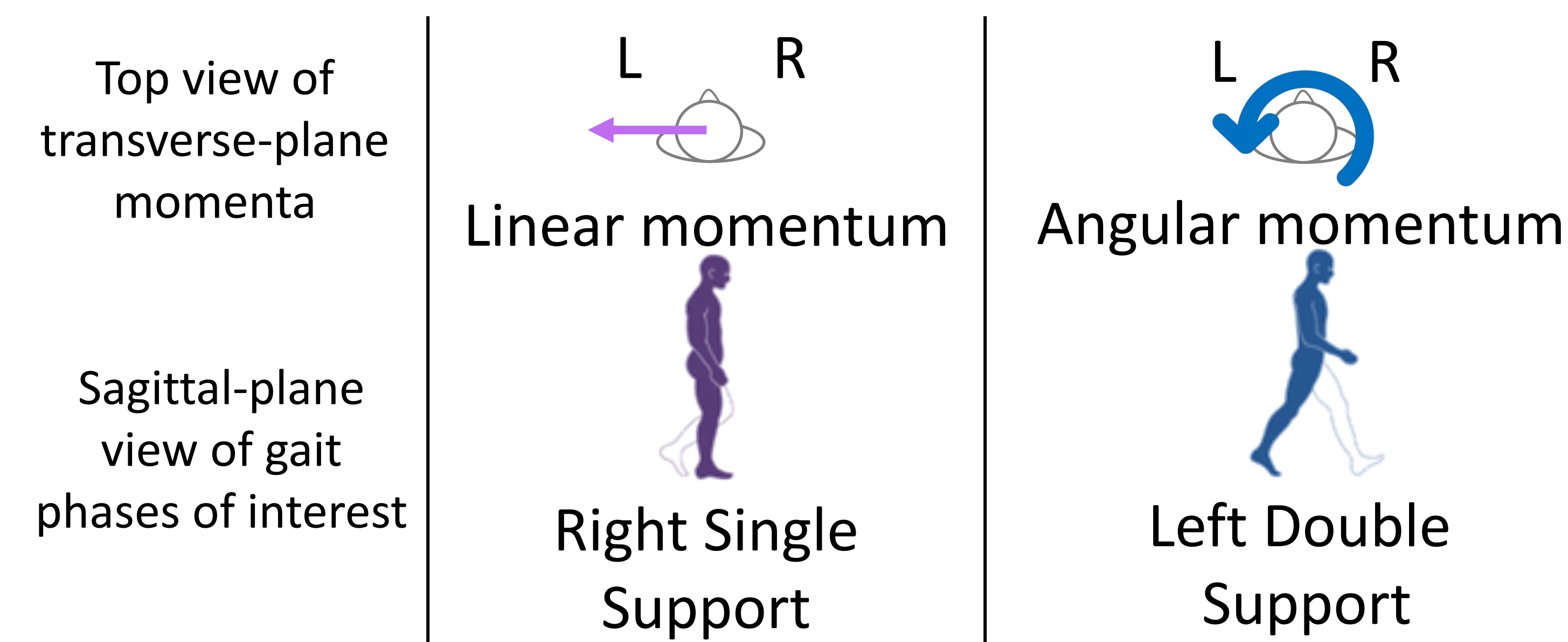


Lab website



Introduction

We previously found that for young adults during straight-line gait and left turns, leftward transverse-plane **linear** and **angular** momenta are generated during **right single support** and **left double support**, respectively [1].



Hypothesis: During straight-line gait and turns, similar to young adults, older adults generate the largest leftward **linear** momentum during **right single support**, and the largest **angular** momentum during **left double support**.

Methods

Participants & Equipment

- Nine participants (2 m 7 f; 71 ± 6 yrs.; MoCA > 23, DGI > 19) wore reflective markers on 13 segments (250 fps)

Tasks

- 10 trials of:
 - 10 m straight-line gait
 - 90-degree left turns

Metrics

- **Linear:** change in momentum (ΔPx) and average force ($F_{x,avg}$)
- Left is negative (-X axis, **Fig. 1**)
- **Angular:** change in momentum (ΔHz) and average moment ($M_{z,avg}$)
- Leftward rotation is positive (about vertical Z axis)

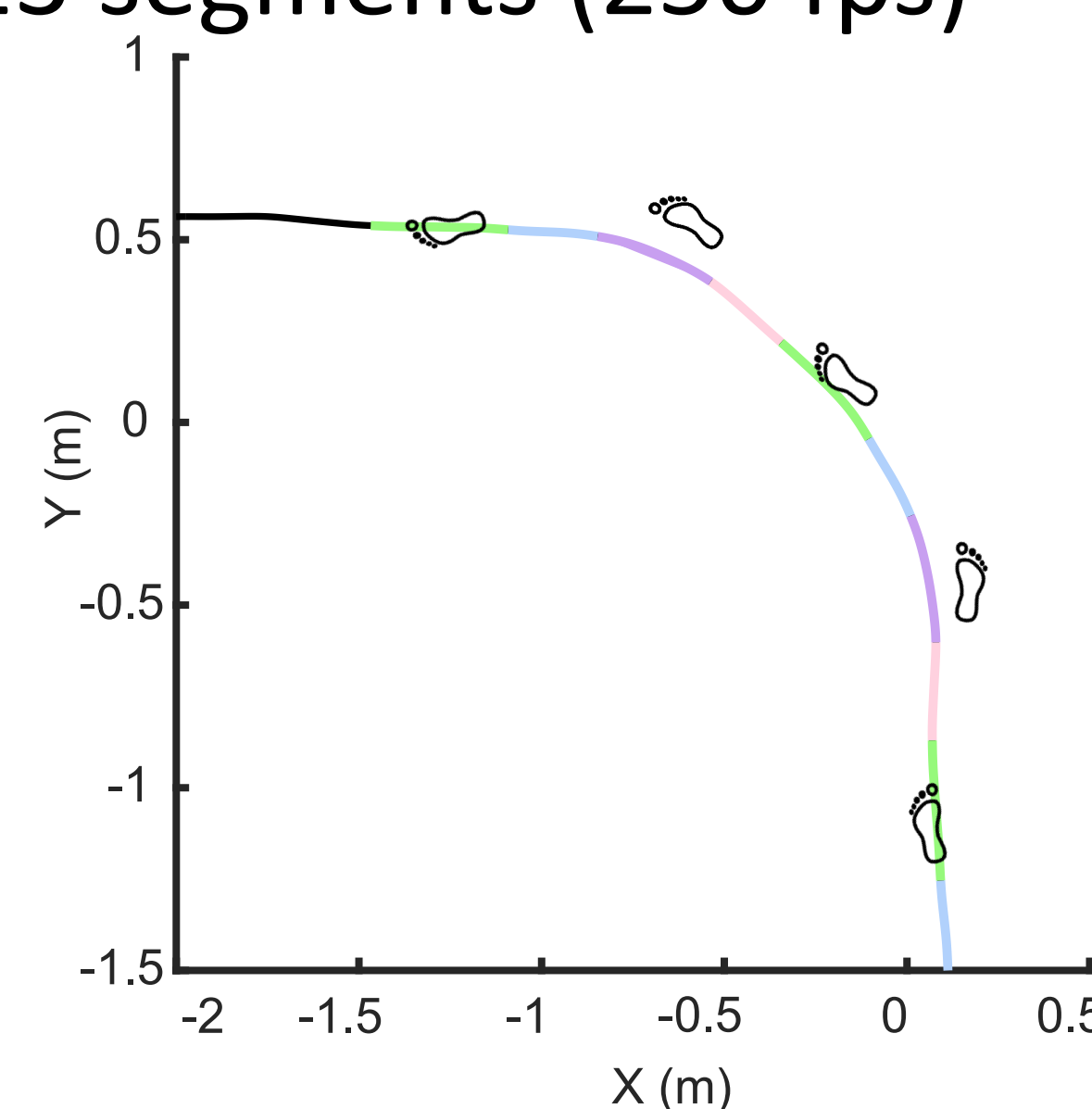


Figure 1. Center of mass trajectory and footsteps of 90-degree left turn. Colors are gait phases.

Statistics

- Linear mixed model between gait phases within each task, for each metric

Results

Linear momentum is generated more towards the left during **right single support** in turns and straight-line gait

Angular momentum is generated more towards the left during **left double support** in turns and straight-line gait

○ Right Double Support (RDS) ○ Right Single Support (RSS) ○ Left Double Support (LDS) ○ Left Single Support (LSS)

Straight-line Gait

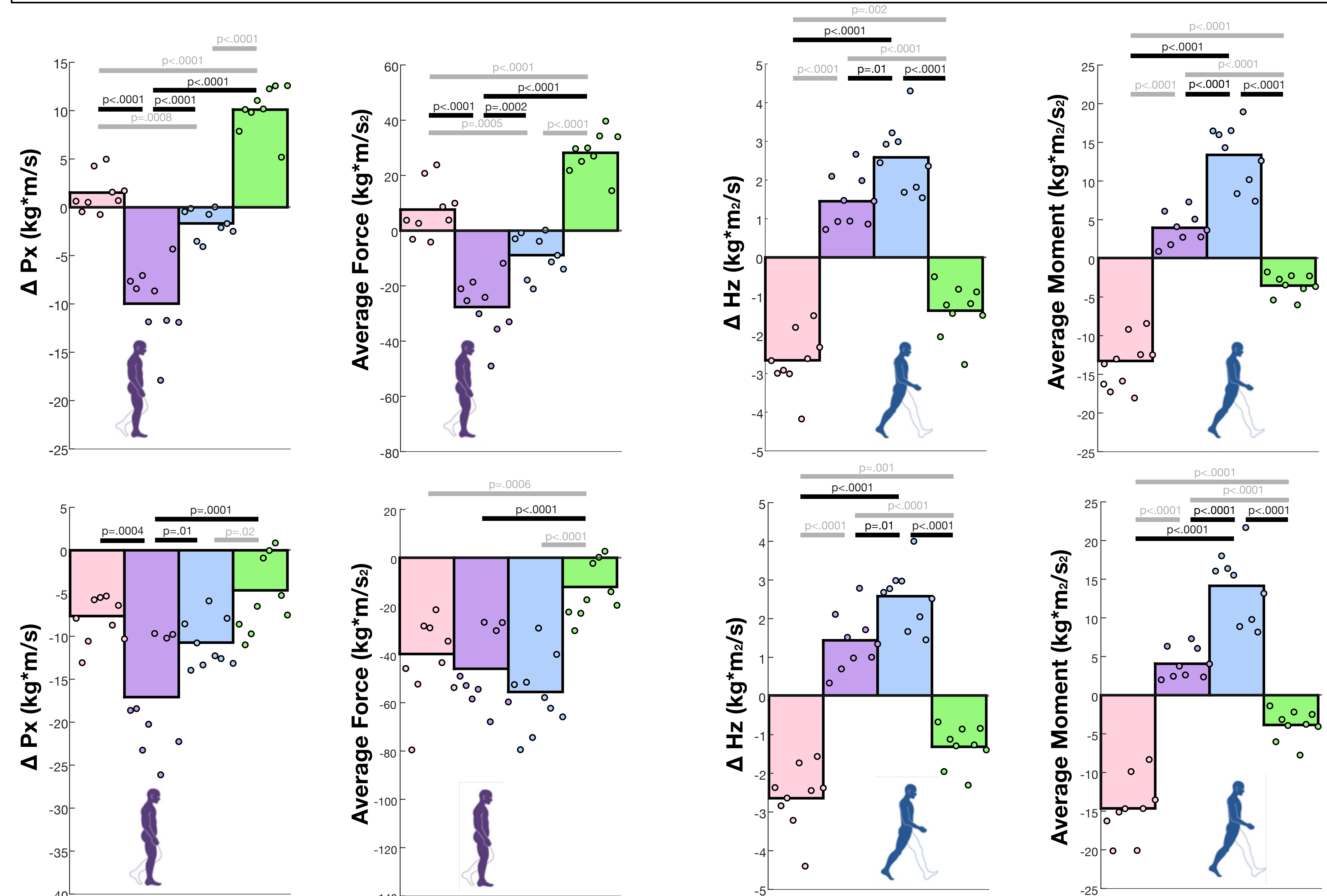


Figure 2. Group-level mean per gait phase for each metric. Each point is one participant's average for that gait phase. Black bars show differences from the hypothesized gait phase of interest (**right single support** for **linear**, **left double support** for **angular**).

Discussion & Conclusion

- Similar to young adults, healthy older adults may leverage momenta generation strategies during turns that are used during straight-line gait [1]
- During turns, left single support contributes less to F_x compared to the other gait phases (**Fig. 2**).
- Average moment is largest in left double support phase.

References

1. Tillman et al., Sci. Reports, 2023.

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