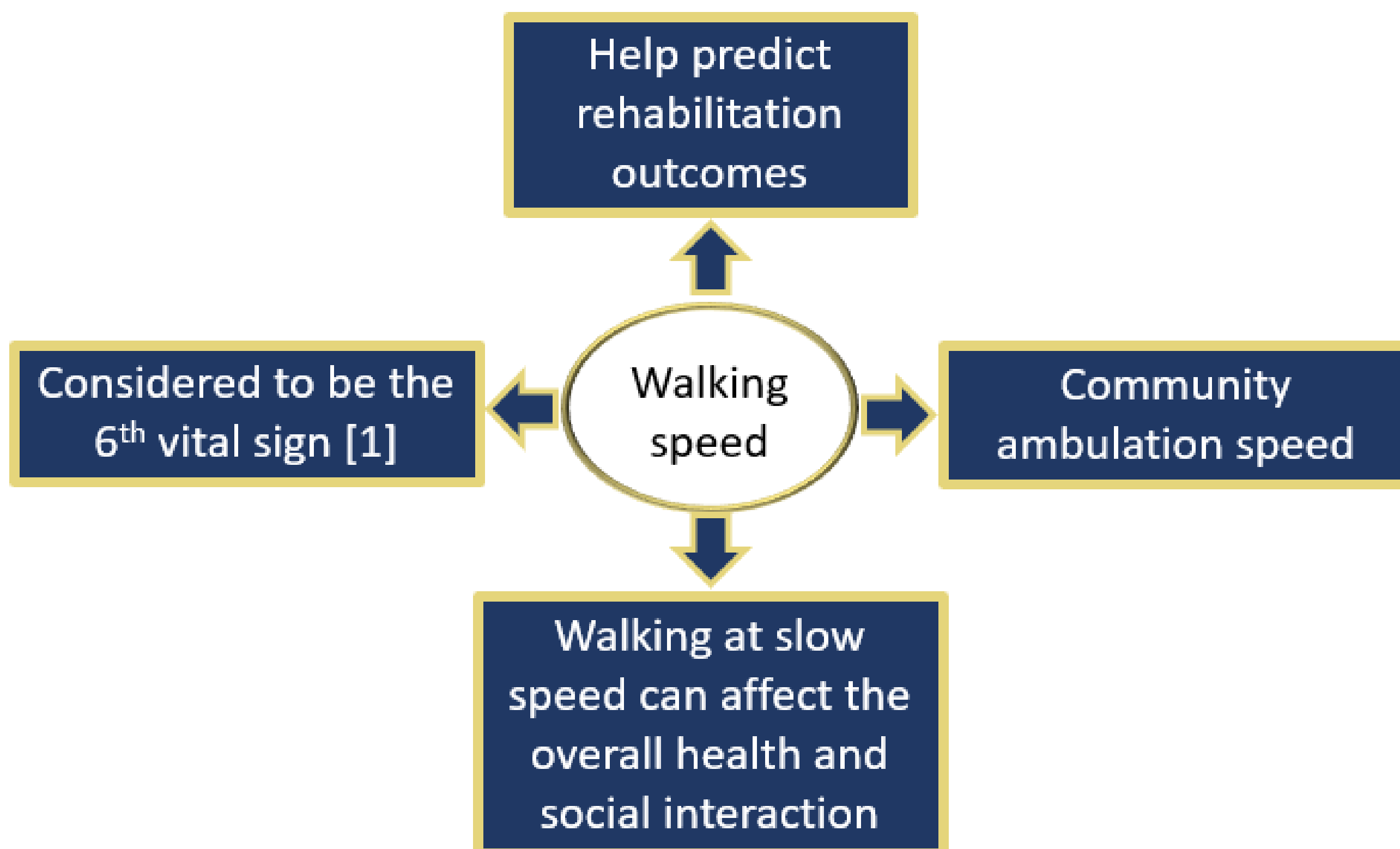


Importance of walking speed



Kinematic difference between slow & self-selected speed walking

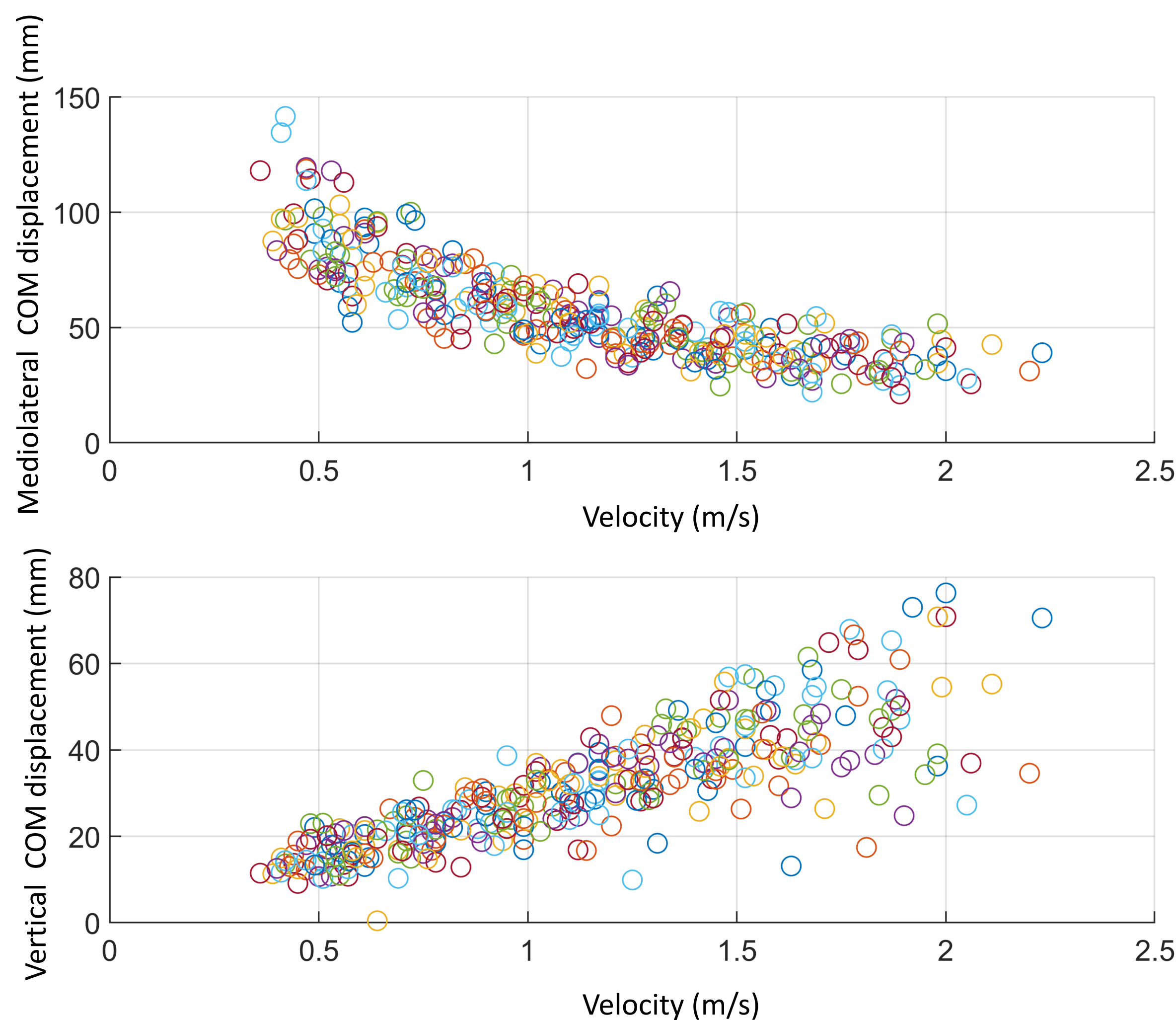


Fig 1. Mediolateral & vertical displacements of mass center as function of speed for 27 subjects walking on treadmill. (Data from [2].)

Proposed work

Hypotheses

- Mechanics of slow walking are different from those of walking at self-selected speeds.
- Interplane dynamic coupling indicates how sagittal plane dynamics contribute to stabilize frontal plane dynamics & vice versa.

Plan of work

- Study effects of walking speed on this coupling.
- Examine how absence of coupling at slow speeds contributes to different gait strategy.
- Develop metric, based on coupling, that predicts transition from slow to self-selected-speed walking.
- Investigate how ambulatory assistive devices (AADs) impact coupling & correspondingly, gait strategy.

Impact

- Develop fundamental understanding of mechanics of slow walking & transition to conventional mechanics at self-selected speeds.
- Enhance rehabilitation methods with information provided by coupling metric.
- Generate performance gait parameters for slow walking based on the coupling metric.

References

- [1] Middleton, et al. Walking speed: The functional vital sign. *J Aging PhysActiv*23(2):314-22, 2015.
- [2] Fukuchi, et al. A public dataset of overground and treadmill walking kinematics and kinetics in healthy individuals. *PeerJ*6:e4640, 2018.