

# Asymmetric Gait Training with a Tied-Belt Treadmill



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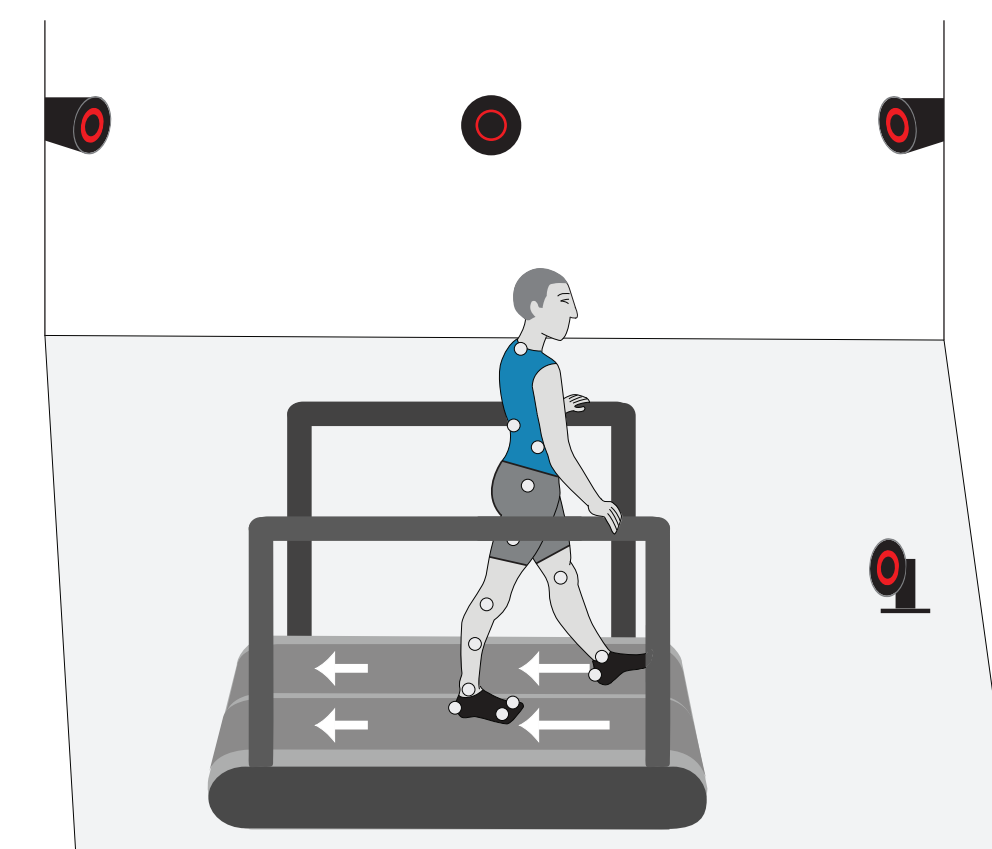
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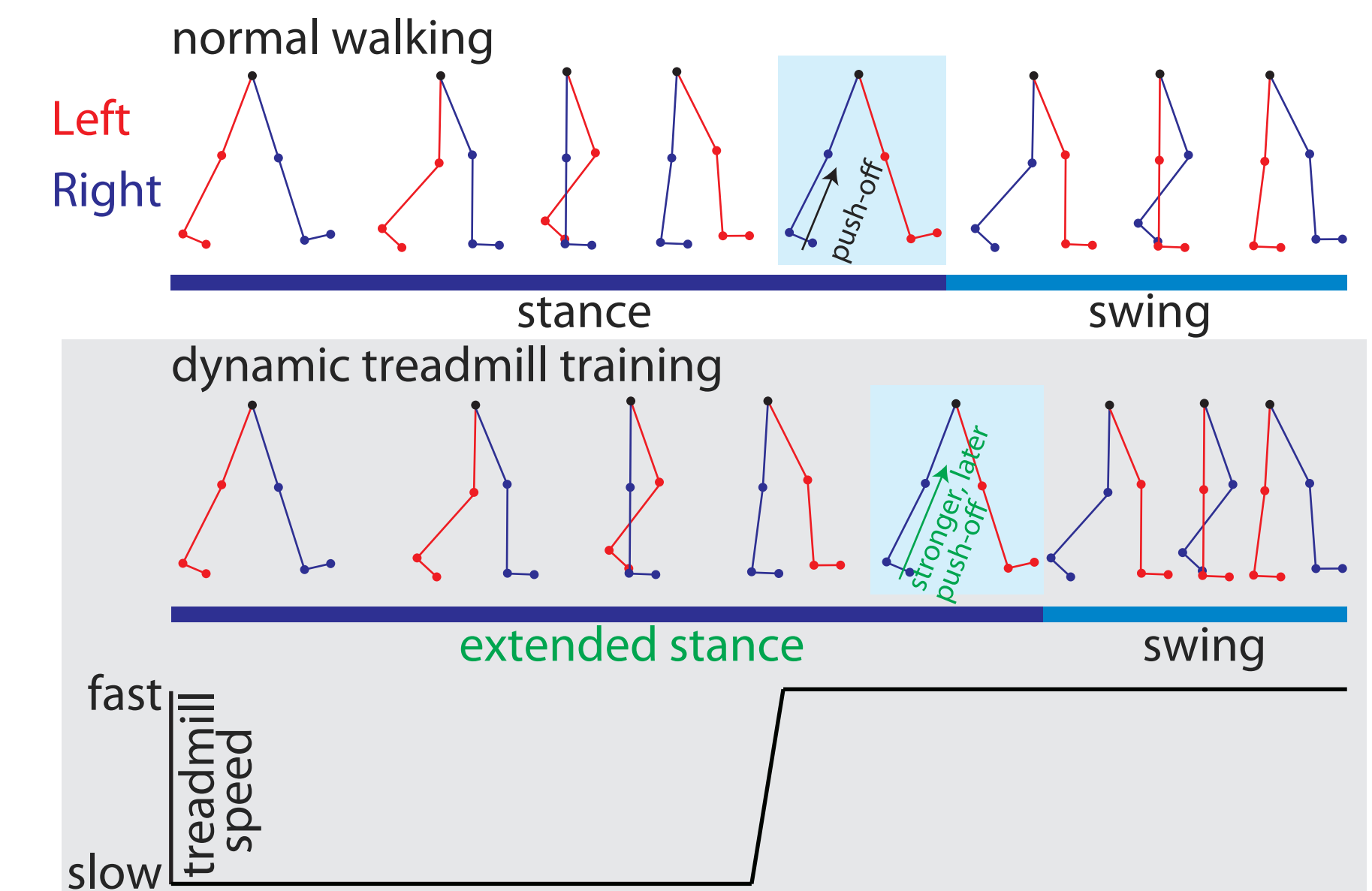
## Question

Can tied-belt (i.e. single belt) treadmill training elicit between-leg differences in walking mechanics?

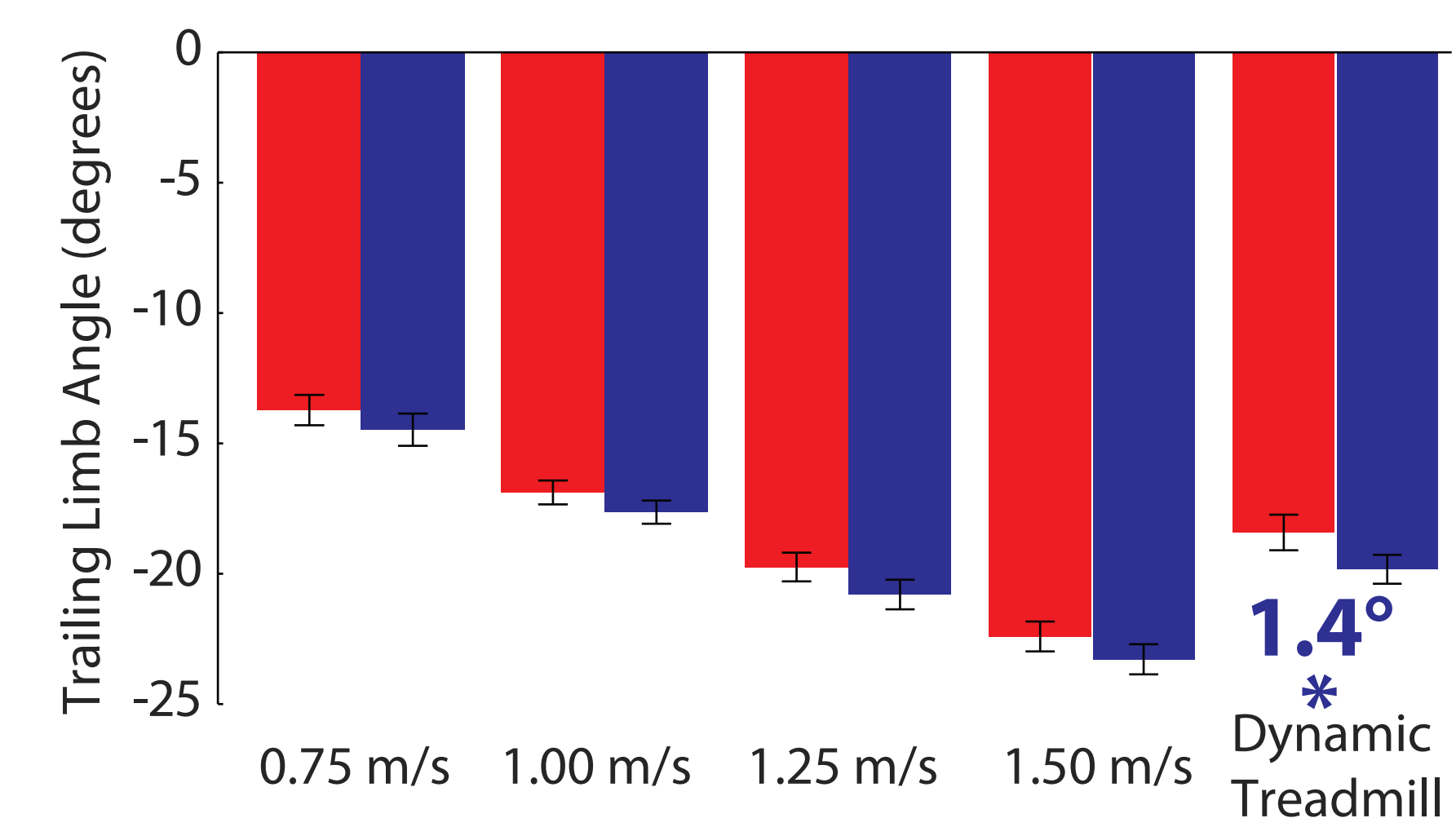
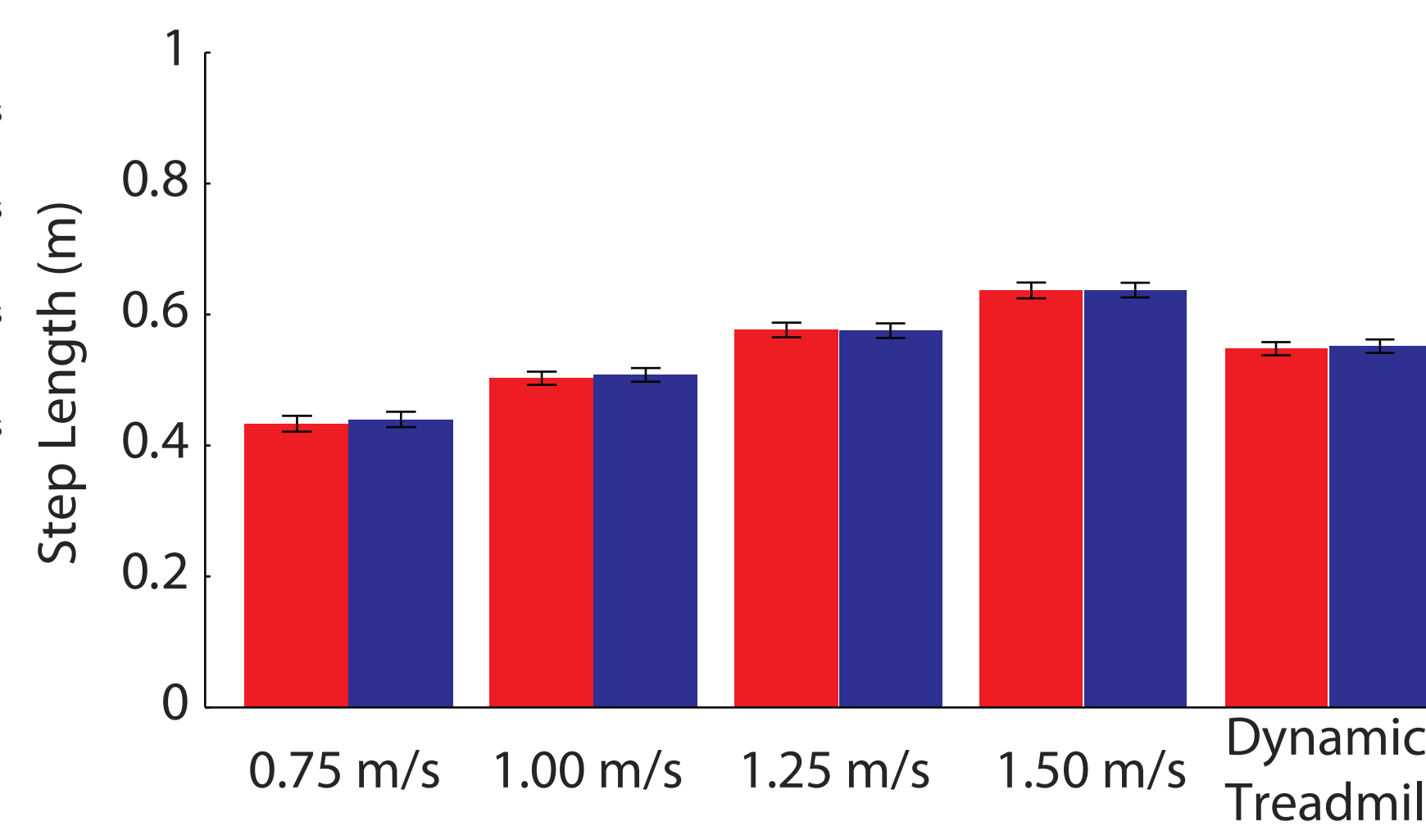
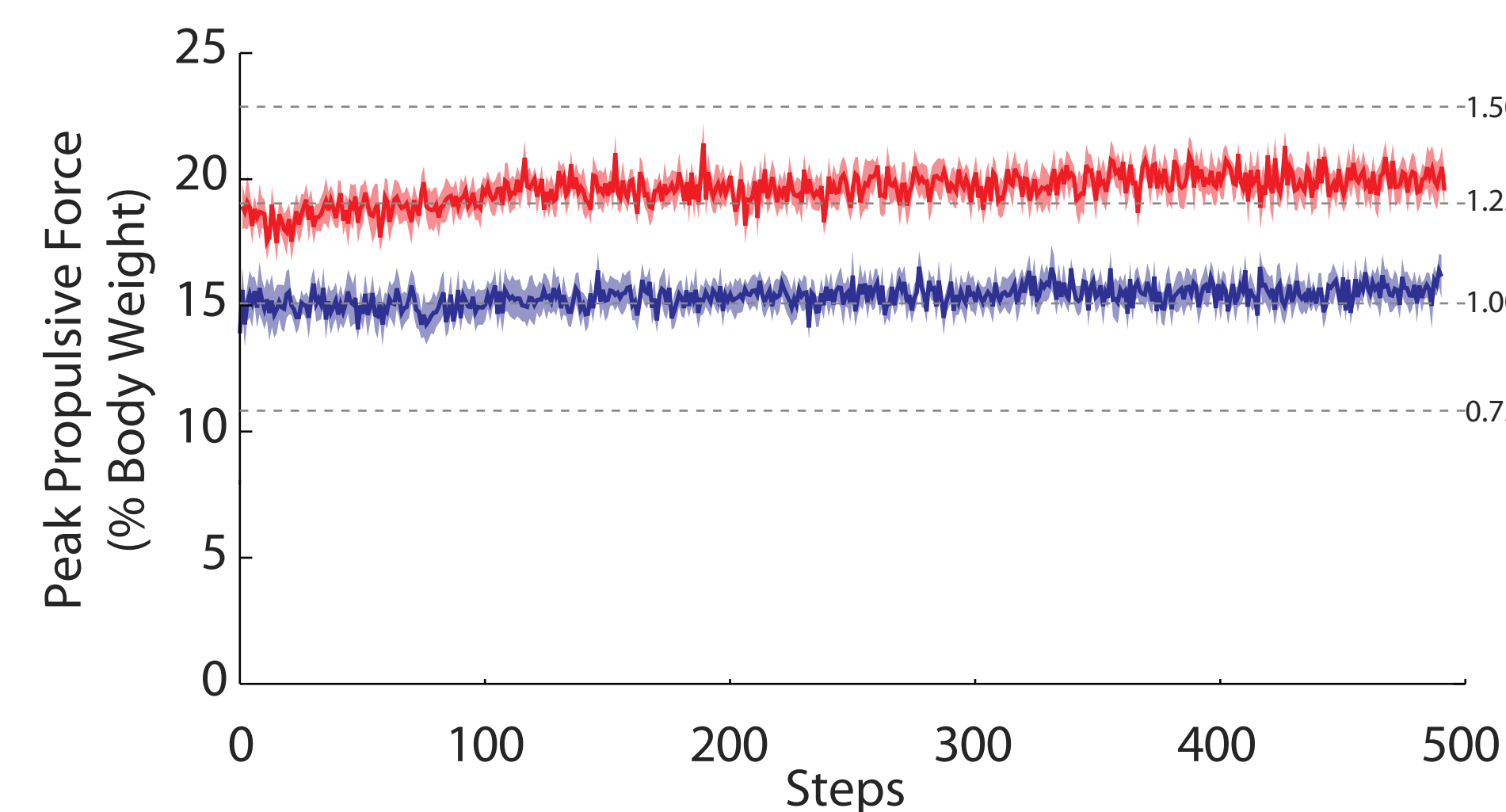
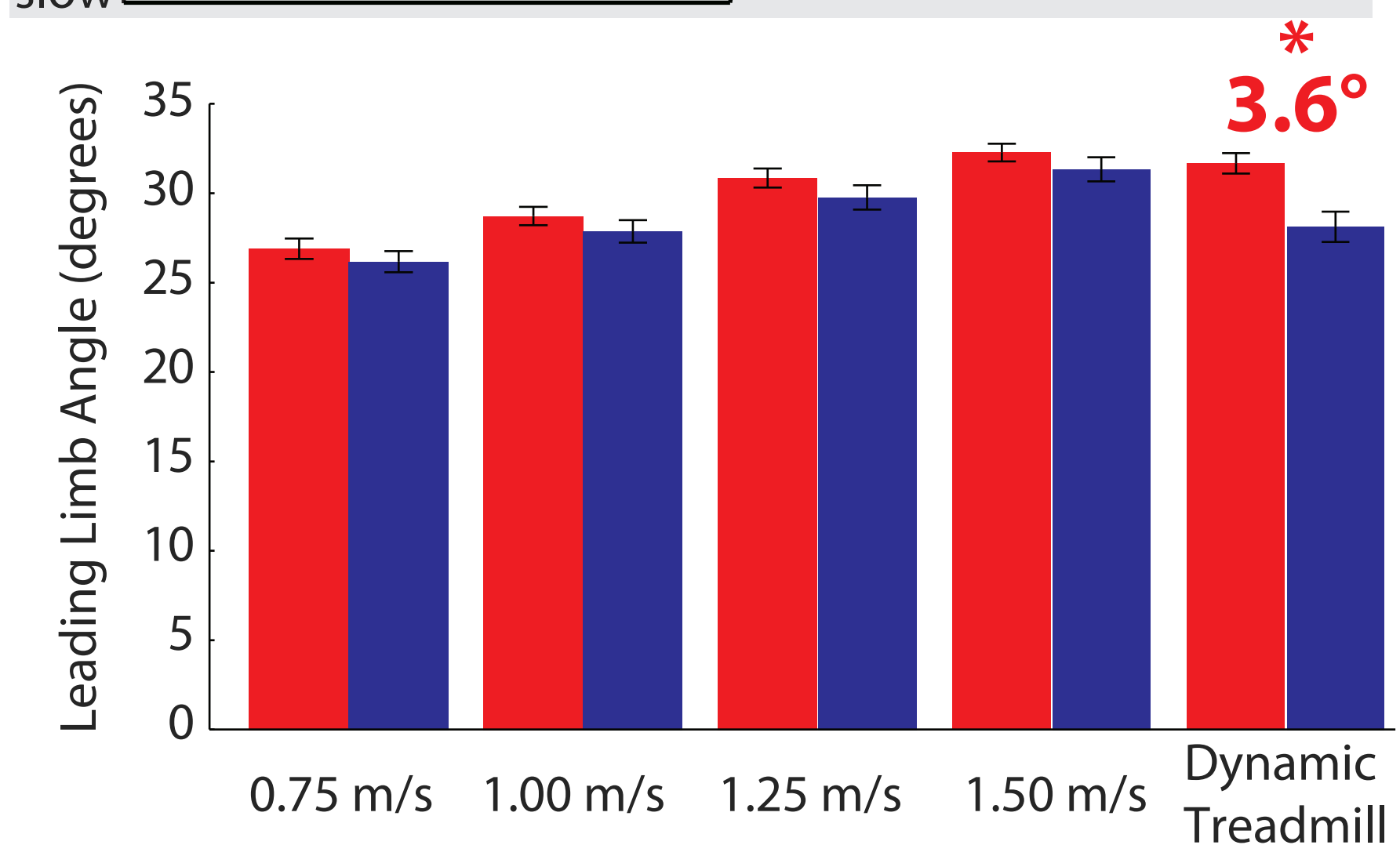
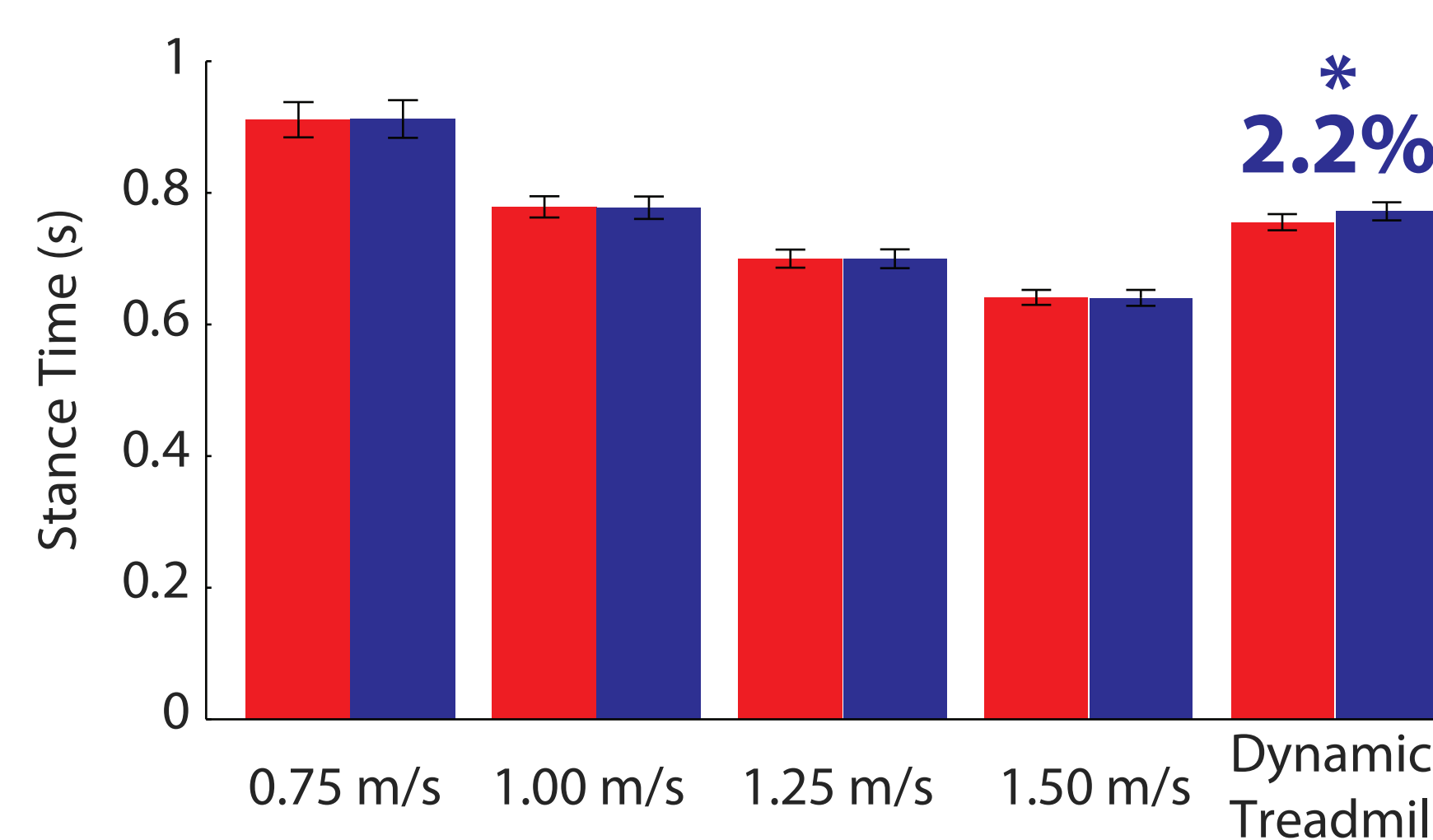
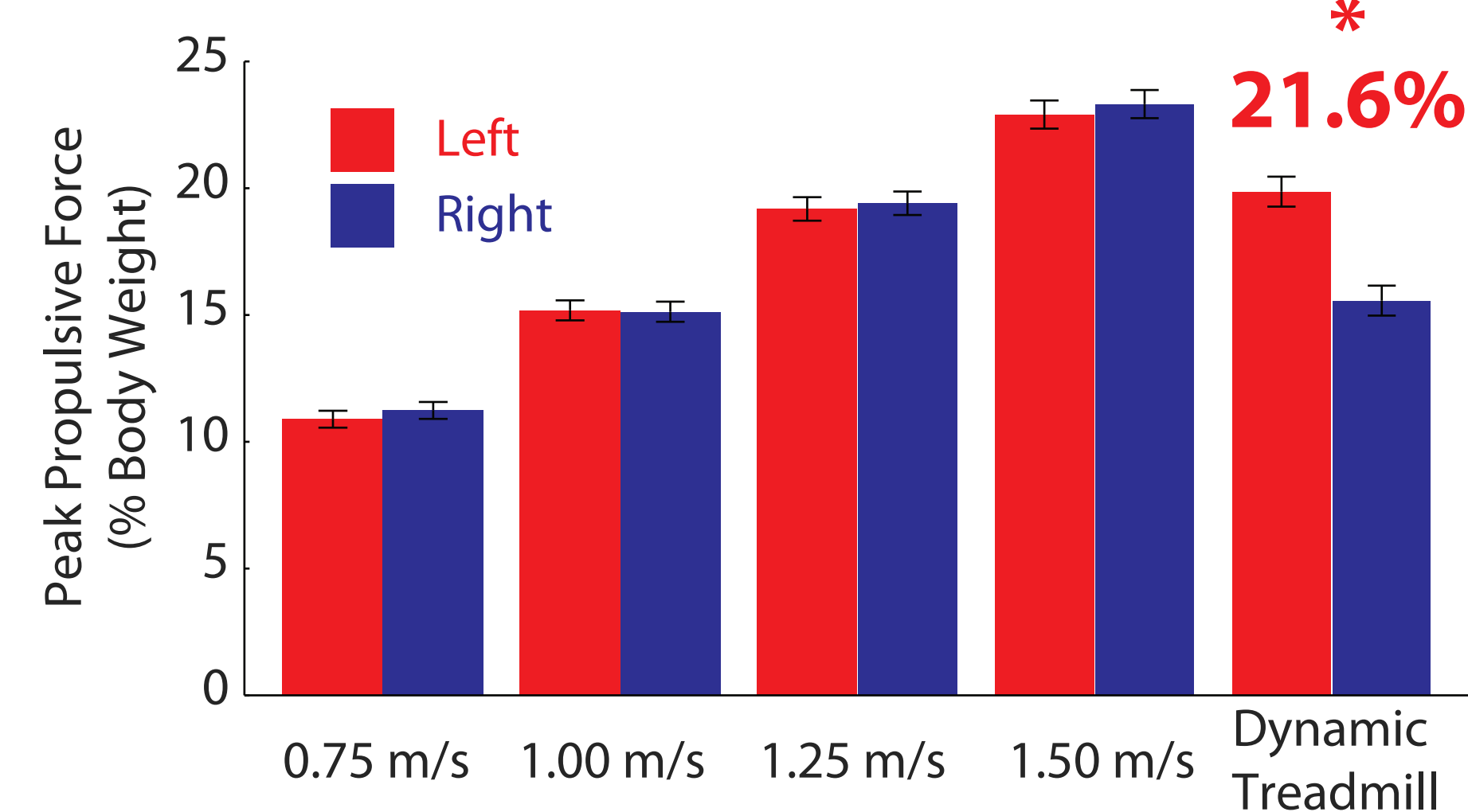
## Experimental Setup



Dynamic Treadmill:  
 Slow speed: 0.75 m/s  
 Fast speed: 1.50 m/s  
 (De)acceleration: 6 m/s<sup>2</sup>  
 n = 10 (6 F)  
 age: 22.3 ± 3.6 years  
 mass: 64.7 ± 16.2 kg

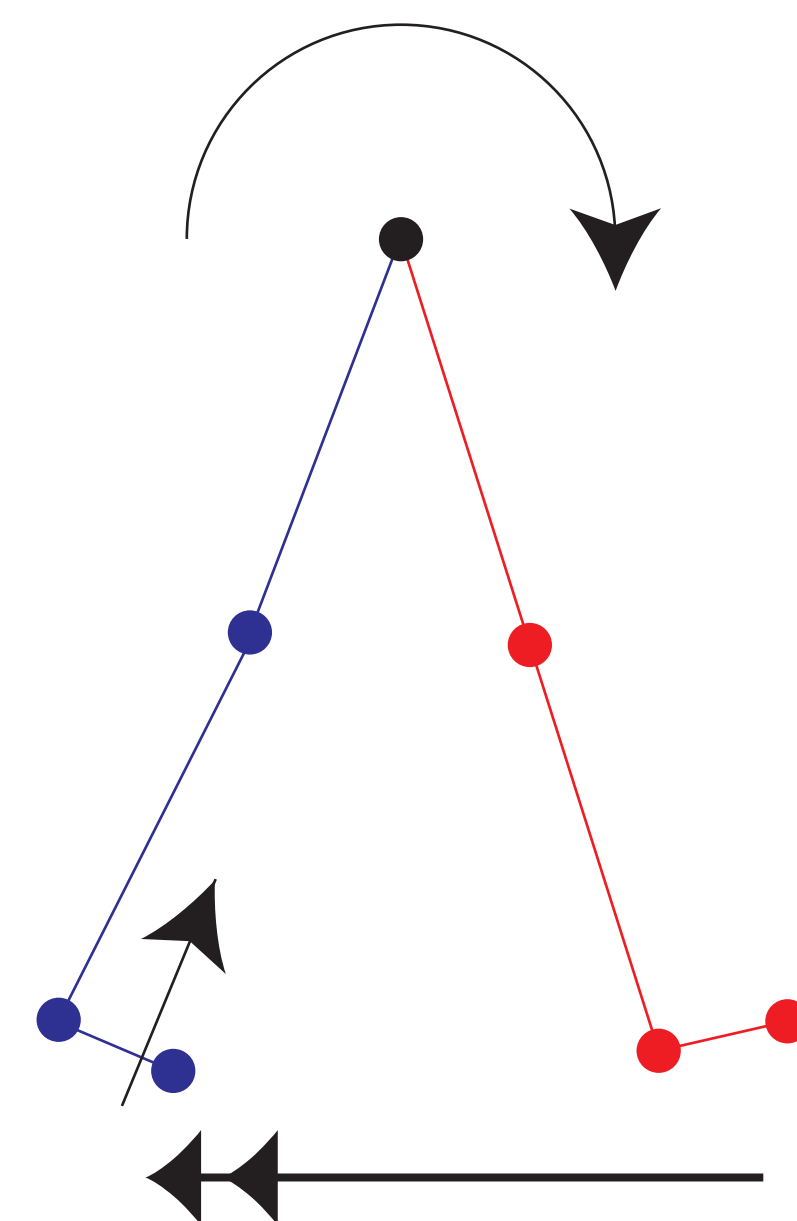


## Results



## Discussion

- Contrary to predictions, push-off was increased in the left (slow) leg compared to the right (fast)
- Treadmill (de)acceleration seemingly increased (alleviated) the need for a large push-off due to an induced redirection of the center of mass



## Future Directions

- Modulate onset and duration of speed increase
- Analyze impact on metabolic energy expenditure
- Open loop treadmill controller with feedback
- Customized stroke rehabilitation to restore paretic push-off magnitude and timing
- Model predictions to minimize metabolic and/or mechanical power

**A tied-belt treadmill can independently modulate push-off magnitude, limb orientation, and stance timing simply with within-stride changes in belt speed.**