

# THE EFFECT OF VIBRATION-BASED FEEDBACK ON GAIT BIOMECHANICS IN THOSE WITH CHRONIC ANKLE INSTABILITY

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## BACKGROUND

- Lateral ankle sprains are a common and financially burdensome injury that can result in chronic ankle instability (CAI).
- Individuals with CAI express increased inversion throughout the gait cycle and large lateral deviations in center of pressure during the stance phase of gait.
- It is hypothesized that these gait impairments further the progression of CAI as vulnerable positioning at the ankle leads to subsequent injuries and abnormal cartilage loading.
- Abnormal loading leads to post-traumatic osteoarthritis.

## OBJECTIVES

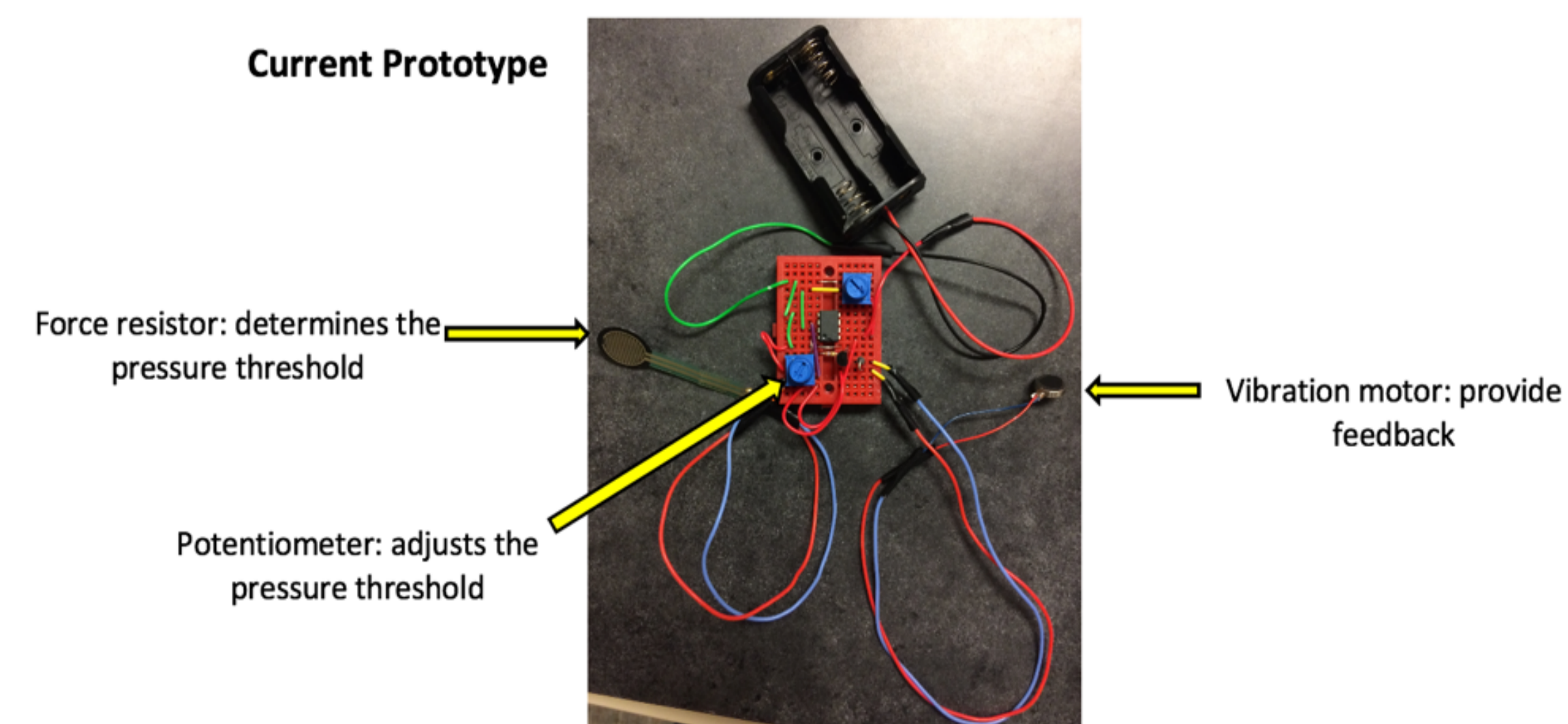
To determine if a single vibration-based feedback gait training session in 1.) a laboratory environment and 2.) a real-world environment can decrease excessive inversion in individuals with chronic ankle instability

## PARTICIPANTS

7 participants were recruited and met the inclusion criteria

Age (years)	Height (cm)	Weight (kg)	# of Ankle Sprains
23.28 ± 3.49	170.49 ± 10.02	73.26 ± 11.59	4.43 ± 2.32

## DEVICE

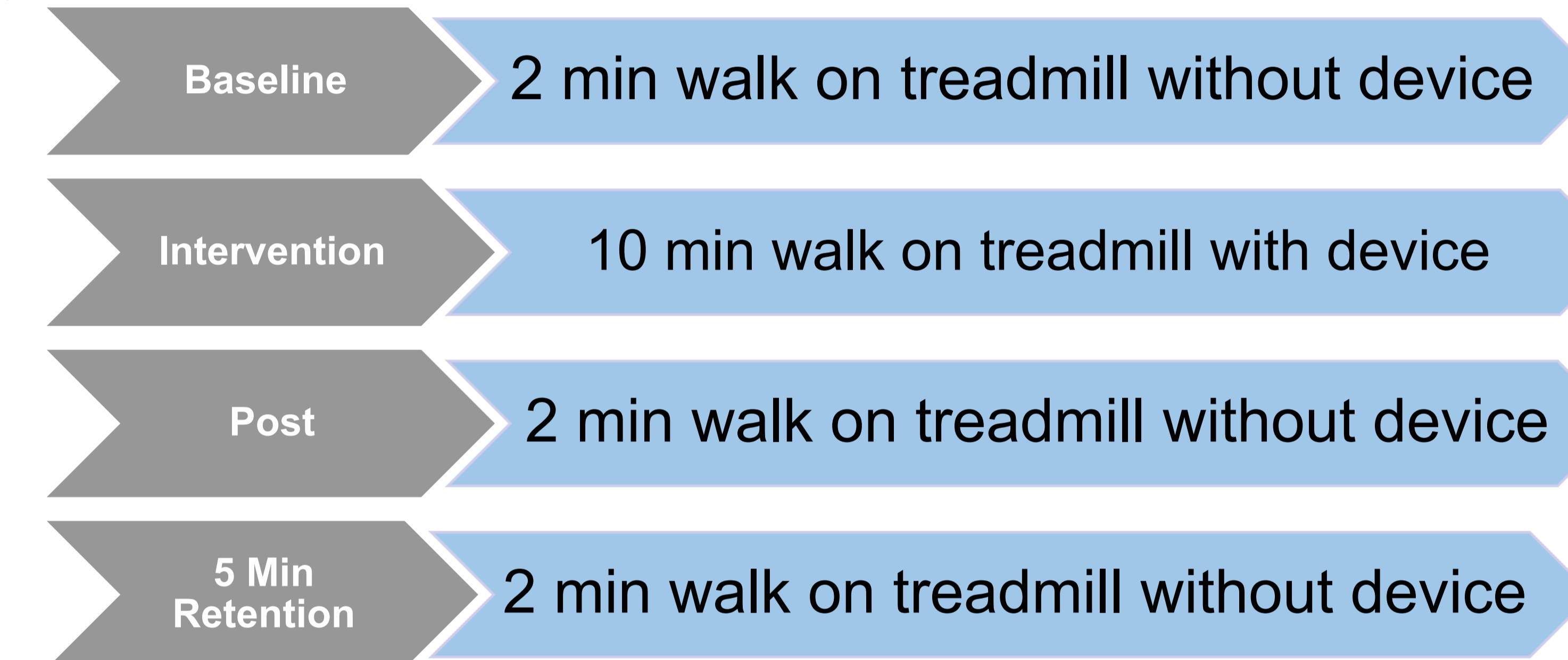


## METHODS

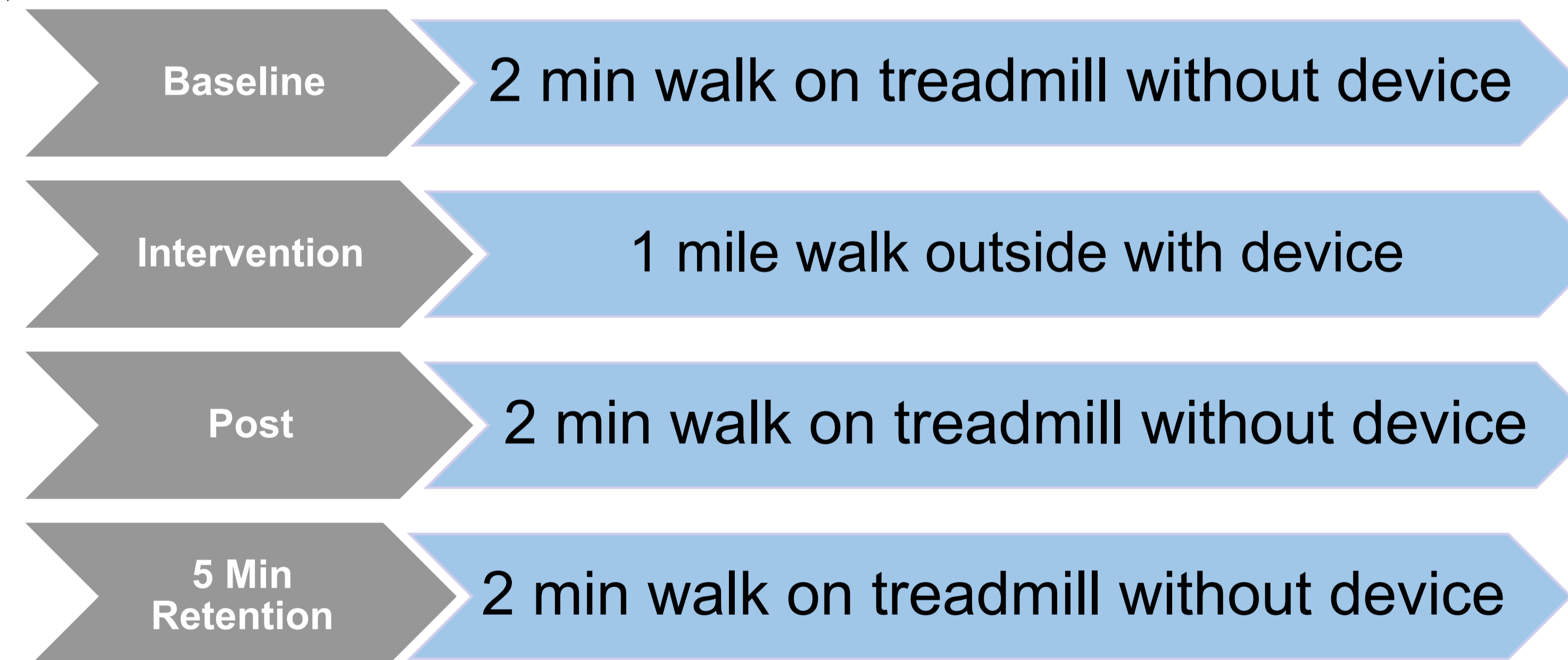
### Procedures:

- Cross-over study design with two sessions at least 48 hours apart

#### 1.) Laboratory Session

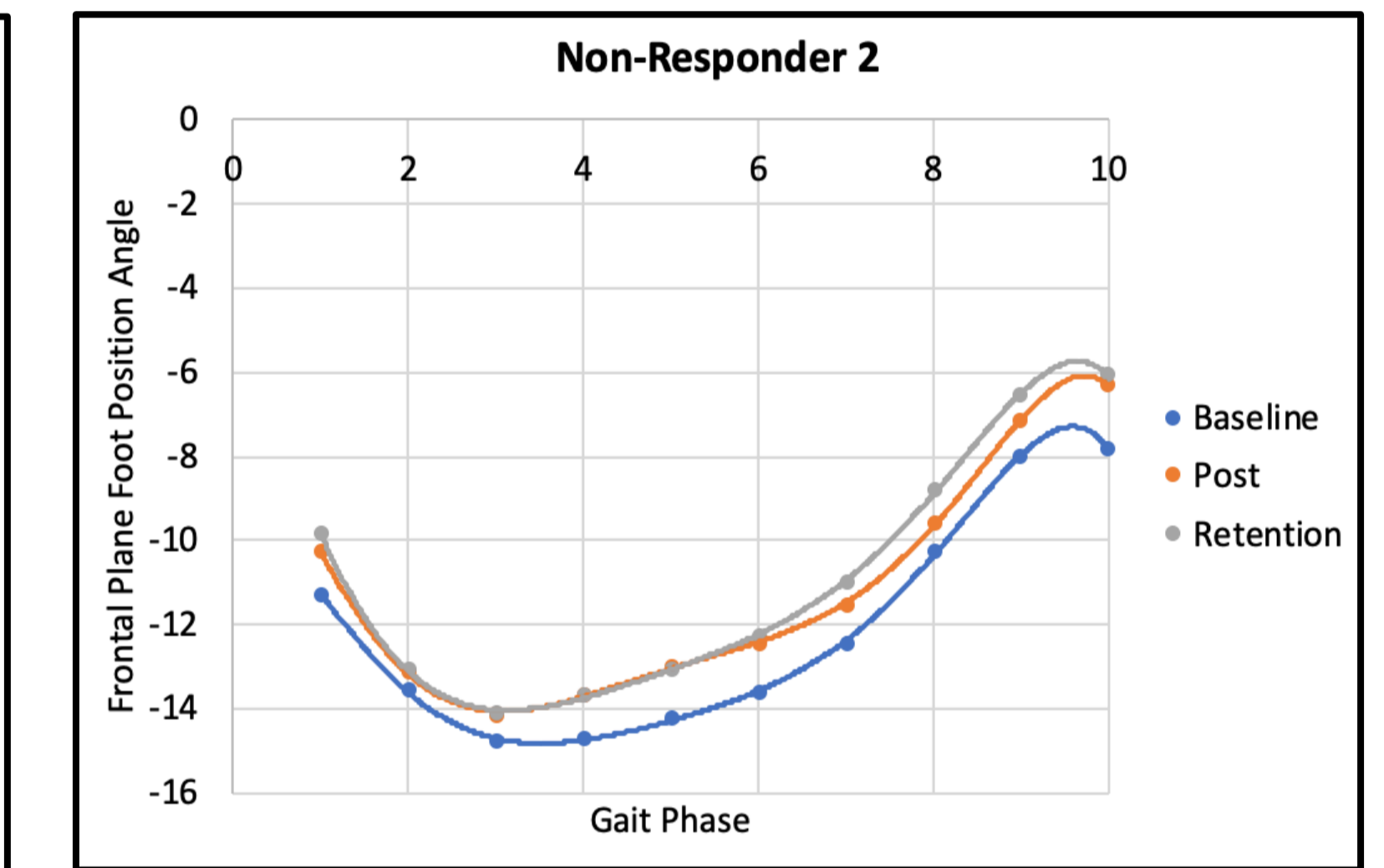
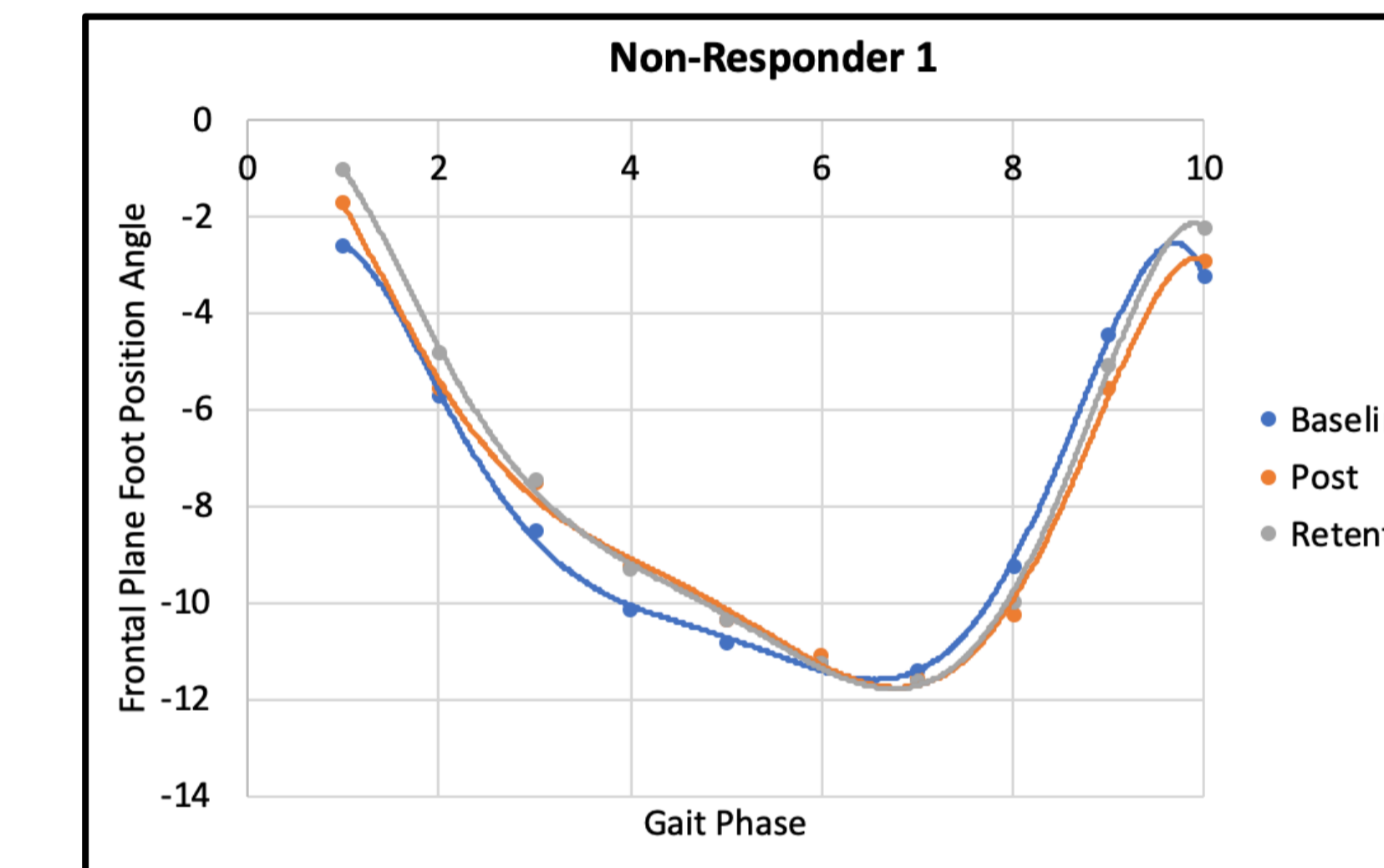
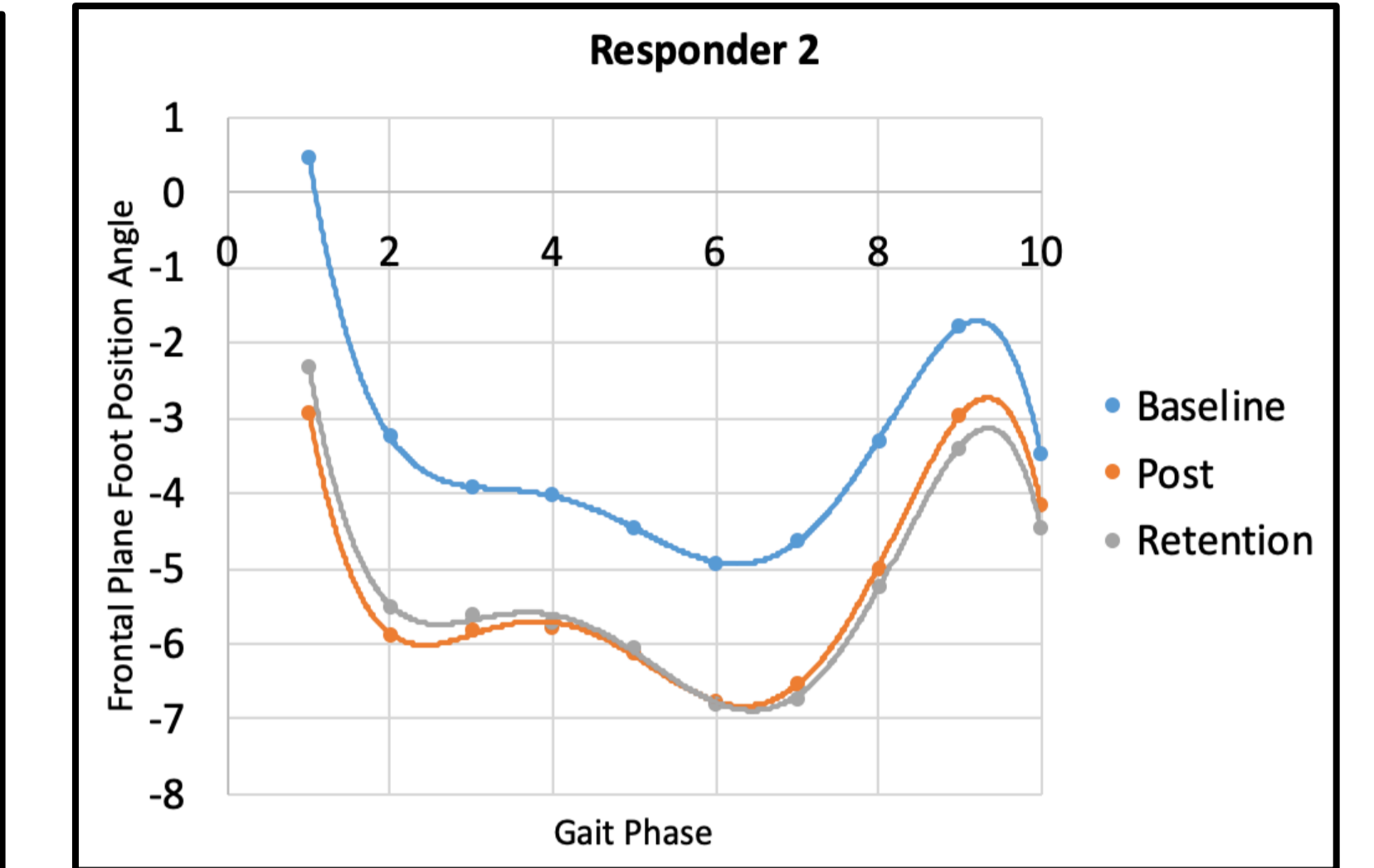
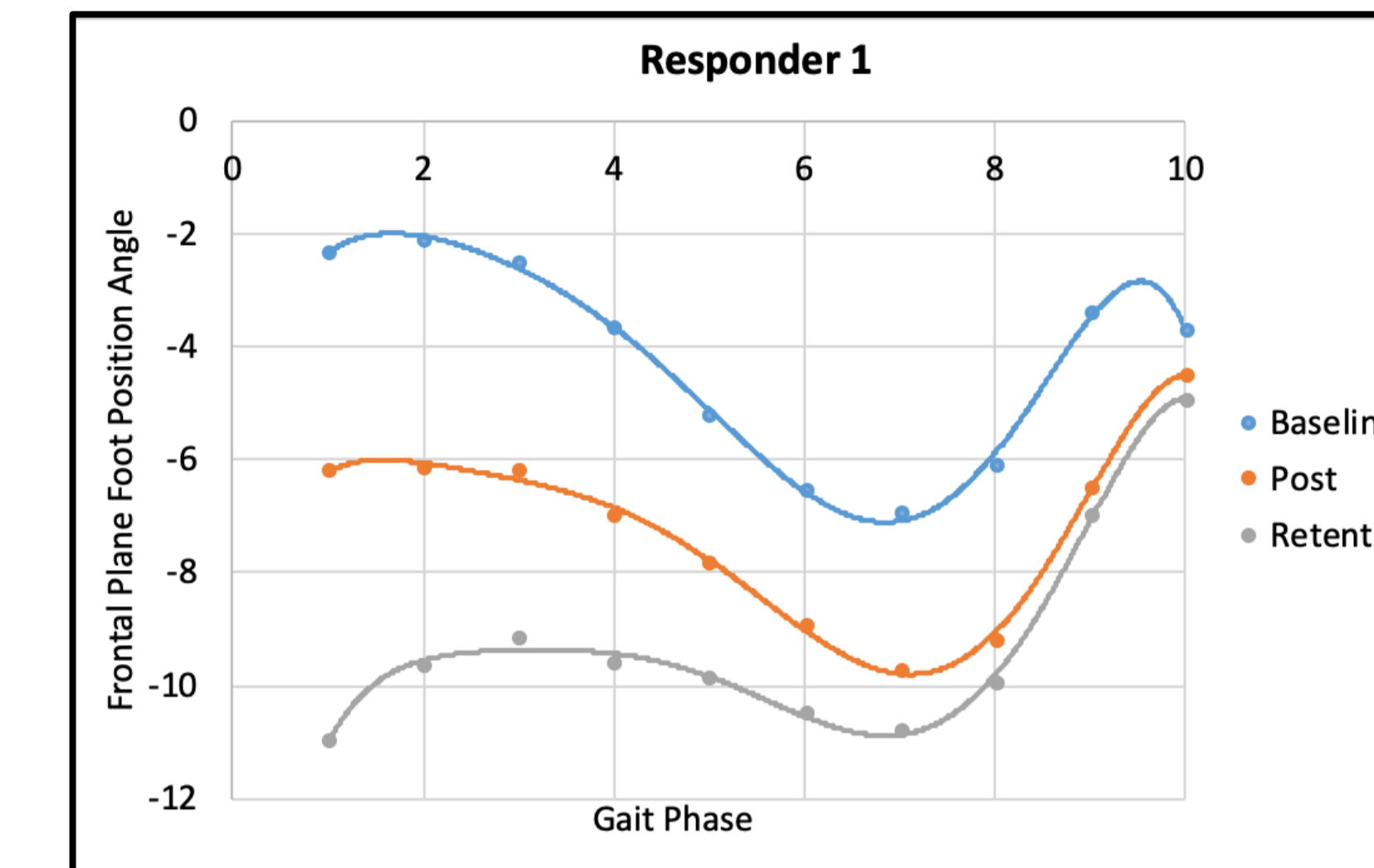


#### 2.) Real-World Session



### Statistical Analysis:

- Non-parametric Friedman's repeated measures ANOVAs
- Hedge's G to measure effect size
- Estimated effect size is 0.3, alpha set at 0.05, and 1-beta at 0.8, indicates a need for 20 subjects



Despite non-significant group differences. Visualization of the data showed that some, but not all, participants responded to the gait retraining session. Above are 2 participants who responded and 2 participants who did not respond to the treatment.

## RESULTS & DISCUSSION

- Stance phase was divided into 10 separate sections
- Across the 10 sections, there were no significant changes in the inversion ankle angle positioning between baseline, post, and retention measures during the laboratory session ( $p > 0.05$ ) and during the real-world session ( $p > 0.05$ ).
- Because some participants responded to the intervention, it is possible we would see significant results when a larger sample size is collected and processed.
- Future research should focus on understanding why some participants, but not all, responded to the intervention.
- The impact of treatment volume, duration, and feedback parameters should also be investigated.

## REFERENCES

1. Delahunt E, Monaghan K, Caulfield B. Altered neuromuscular control and ankle joint kinematics during walking in subjects with functional instability of the ankle joint. *Am J Sports Med* 34: 1970–1976, 2006.
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3. Shah S, Thomas AC, Noone JM, Blanchette CM, Wikstrom EA. Incidence and cost of ankle sprains in United States emergency departments. *Sports Health* 8: 547–552, 2016.