

University of Dayton

eCommons

---

University of Dayton Doctor of Physical Therapy  
Annual Research Symposium

Department of Physical Therapy

---

5-7-2020

## Effect of Ankle-Foot Orthosis on Reactive Stepping in Healthy Young Adults: A Pilot Study

Kyra Twohy  
*University of Dayton*

Hunter Andrews  
*University of Dayton*

Ryan Christopher  
*University of Dayton*

Aaron Scott  
*University of Dayton*

Katie Valentine  
*University of Dayton*

*See next page for additional authors*

Follow this and additional works at: [https://ecommons.udayton.edu/dpt\\_symposium](https://ecommons.udayton.edu/dpt_symposium)



Part of the [Physical Therapy Commons](#)

---

### Recommended Citation

Twohy, Kyra; Andrews, Hunter; Christopher, Ryan; Scott, Aaron; Valentine, Katie; and Jackson, Kurt, "Effect of Ankle-Foot Orthosis on Reactive Stepping in Healthy Young Adults: A Pilot Study" (2020). *University of Dayton Doctor of Physical Therapy Annual Research Symposium*. 2.  
[https://ecommons.udayton.edu/dpt\\_symposium/2](https://ecommons.udayton.edu/dpt_symposium/2)

This Book is brought to you for free and open access by the Department of Physical Therapy at eCommons. It has been accepted for inclusion in University of Dayton Doctor of Physical Therapy Annual Research Symposium by an authorized administrator of eCommons. For more information, please contact [frice1@udayton.edu](mailto:frice1@udayton.edu), [mschlange1@udayton.edu](mailto:mschlange1@udayton.edu).

---

## Authors

Kyra Twohy, Hunter Andrews, Ryan Christopher, Aaron Scott, Katie Valentine, and Kurt Jackson



# Effect of Ankle-Foot Orthosis on Reactive Stepping in Healthy Young Adults: A Pilot Study

Kyra Twohy, Hunter Andrews, Ryan Christopher, Aaron Scott, Katie Valentine, Kurt Jackson



University of  
Dayton

## Background

Ankle-Foot orthoses (AFOs) are commonly used to improve gait in persons with neurological disorders. Rigid AFOs are placed on the foot to create stability and control, something this population often lacks. However, a rigid type of AFO may have negative impact on an individual's ability to complete dynamic balance tasks such as reactive stepping movements when recovering from a loss of balance. To our knowledge, the impact of a rigid AFO on reactive stepping has not been investigated.

## Purpose

The primary purpose of this study was to determine the impact of a rigid AFO (Fig.1) on reactive stepping preference in healthy young adults, thus providing preliminary data on healthy individuals' stepping strategy preferences. The collected data can then be used for further research with more neurologically-involved populations.

## Subjects

Twenty participants with no persistent lower extremity injuries. Age: 23.7 +/- 2.2 years. Height 175.9 +/- 9.4 cm. Weight: 75.3 +/- 14.8 kg.

## Methods

This study utilized a lean-and-release procedure (Fig. 2) for inducing a perturbation and subsequent recovery step. Participants were placed in a safety harness and separate belt attachment to the weight support system. A 3D motion capture system recorded the reflective markers placed on each participant's lower limb. Subjects were asked to lean at 10-15% of their bodyweight. Examiners released the subject from the belt as they were required to take a reactive step to regain balance. 10 trials were completed for each condition 1) without an AFO, 2) with a rigid AFO on the right, 3) with rigid AFO on the left (n=10), for a total of 30 releases with the stepping limb recorded for each trial.



Figure 1: Plastic rigid AFO

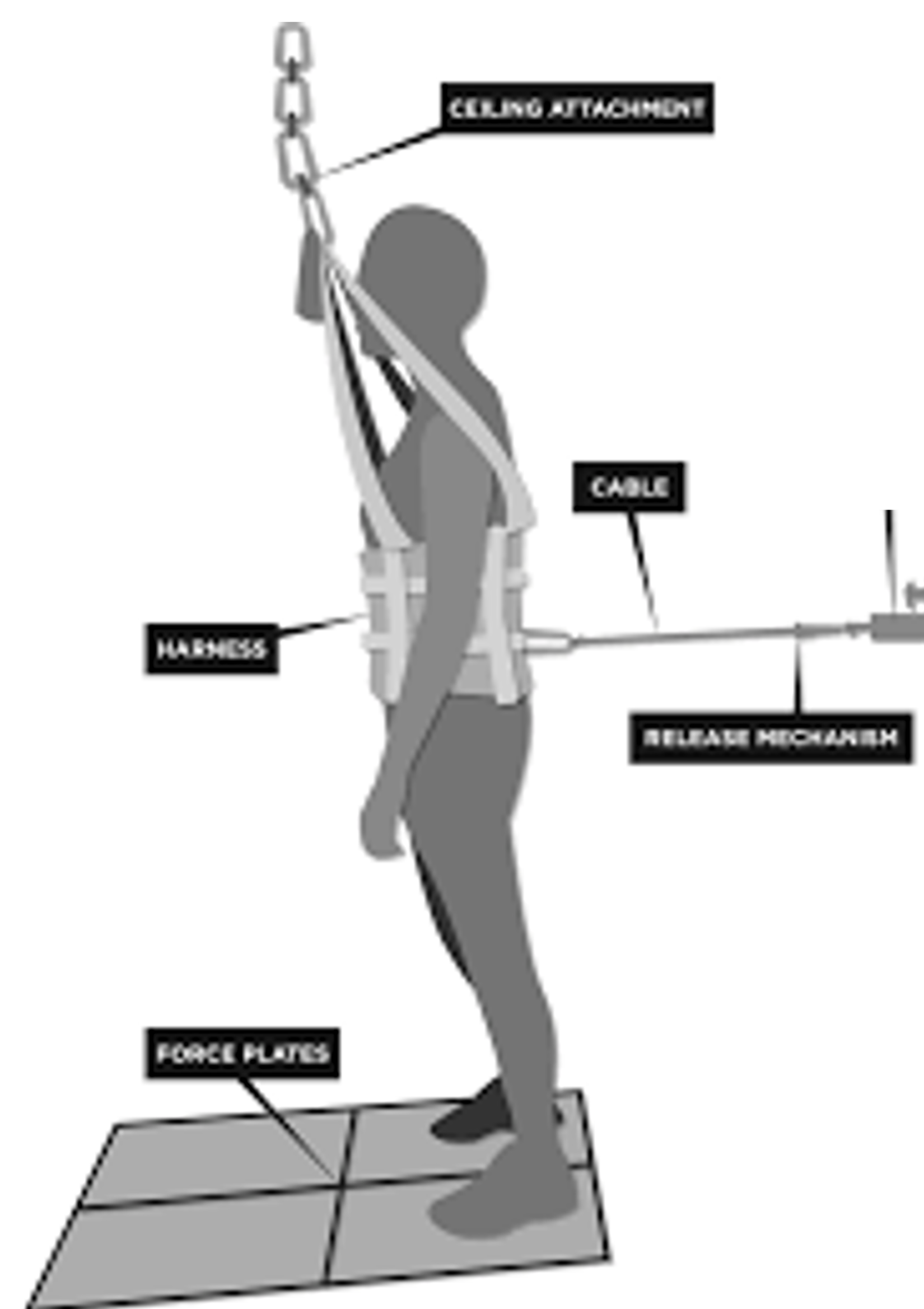
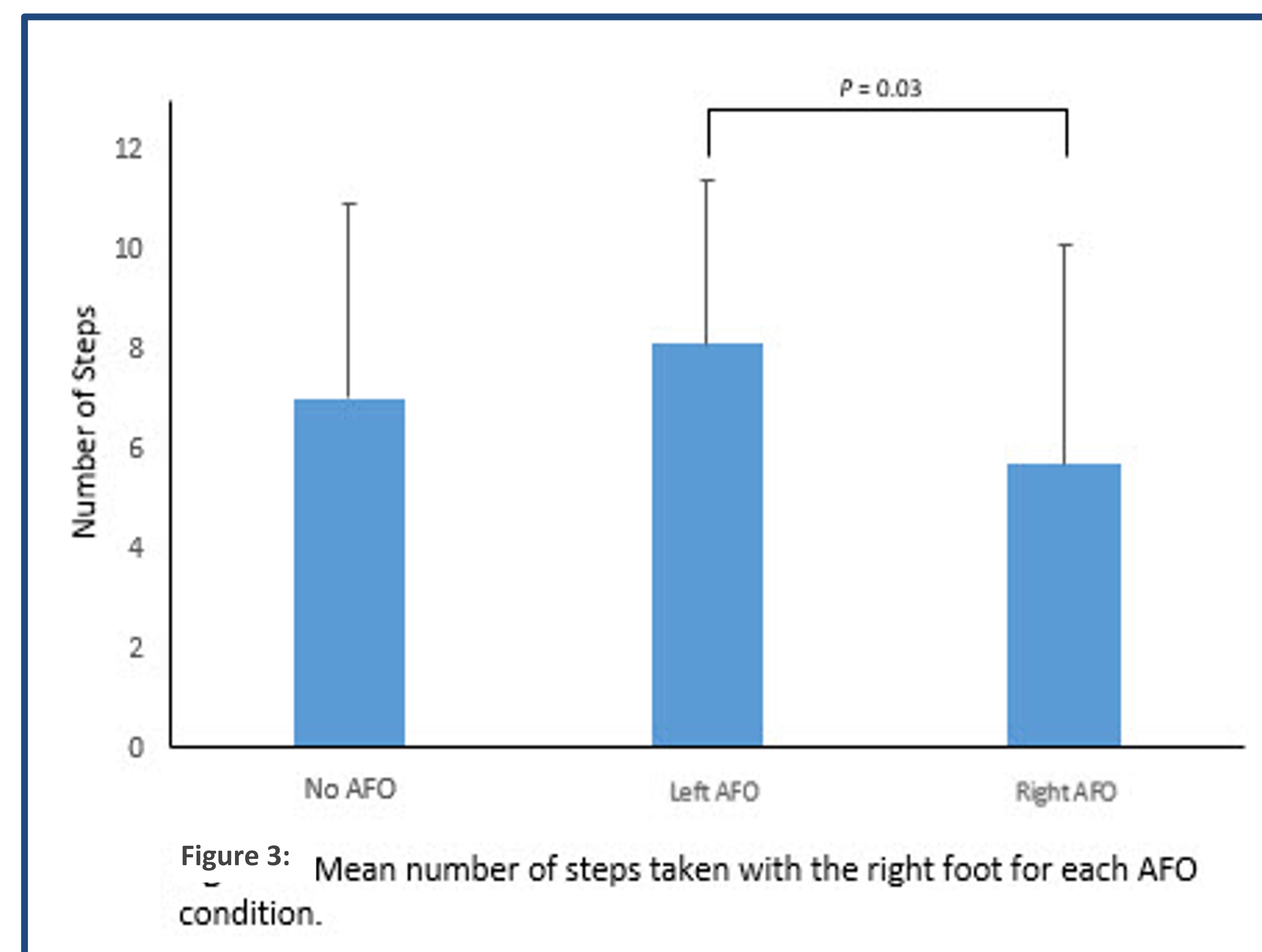


Figure 2: Lean and release set-up

## Results

When wearing no AFO, participants preferred stepping with their right foot ( $7.0 \pm 3.9$ ). There was a significant difference ( $p = 0.03$ ) in preferred reactive stepping limb between the left and right AFO conditions. Reactive stepping with the right foot was greater when an AFO was worn on the left foot ( $8.1 \pm 3.3$ ) compared to the Right foot AFO ( $5.7 \pm 4.4$ ). Figure 3.



## Discussion

An individual is more likely to take a reactive step with their right foot when wearing a left AFO, compared to when the AFO is worn on the right foot. Based on data collected between the three conditions, reactive stepping limb preference is greater for the foot without an AFO. This information can be utilized when treating patients with neurological conditions at risk for falls, and carefully considered when pairing AFO use with reactive balance and ambulatory training.