A Brake-based Over-ground Gait Rehabilitation Device for Increasing Paretic Propulsive Force
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BACKGROUND
• Propulsion force is a key contributor in achieving forward progression while walking [1-2].
• Stroke often reduces the ability to produce propulsion force equally between the two legs, causing propulsion force asymmetry [2].
• Reducing propulsion force asymmetry is correlated with positive walking outcomes after stroke [2-3].

OBJECTIVES
To present a pilot study of the Gait Propulsion Trainer (GPT), a device designed to unilaterally alter propulsion force.

METHODS
Device Components:
• A cable spool attaches to a waist-level stand.
• The cable attaches to a belt worn around the hips.
• A rotary brake periodically resists the spool’s rotation.
• Force sensitive resistors beneath the shoes send wireless signals to turn the rotary brake on.

Pilot Participants:
• 50-year-old female with stroke (19.9 N BL Peak Propulsion).
• 30-year-old male healthy control (133.3 N BL Peak Propulsion).

RESULTS

To analyze the impact of GPT resistance on step length symmetry, we measured the step length of the non-paretic leg and compared it to the paretic leg of the stroke participant. Our results showed that while step length was not largely altered on either leg throughout the experiment for the healthy control, it was reduced in the stroke participant, indicating an increase in GPT resistance and a consequent reduction in step length symmetry.

CONCLUSIONS
• This pilot experiment allowed us to verify the accuracy of the timing of GPT resistance.
• Propulsion impulse symmetry was successfully altered in the healthy control participant.
• Propulsion impulse symmetry was reduced upon GPT resistance exposure in the stroke participant, but this reduction did not scale with resistance magnitude.
• Step length symmetry in our stroke participant increased as GPT resistance magnitude increased.

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REFERENCES