

# Ground Reaction Force Variables Differ Between Dominant and Non-Dominant Limbs During a Drop Vertical Jump Task

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UNC Human Movement Science Curriculum



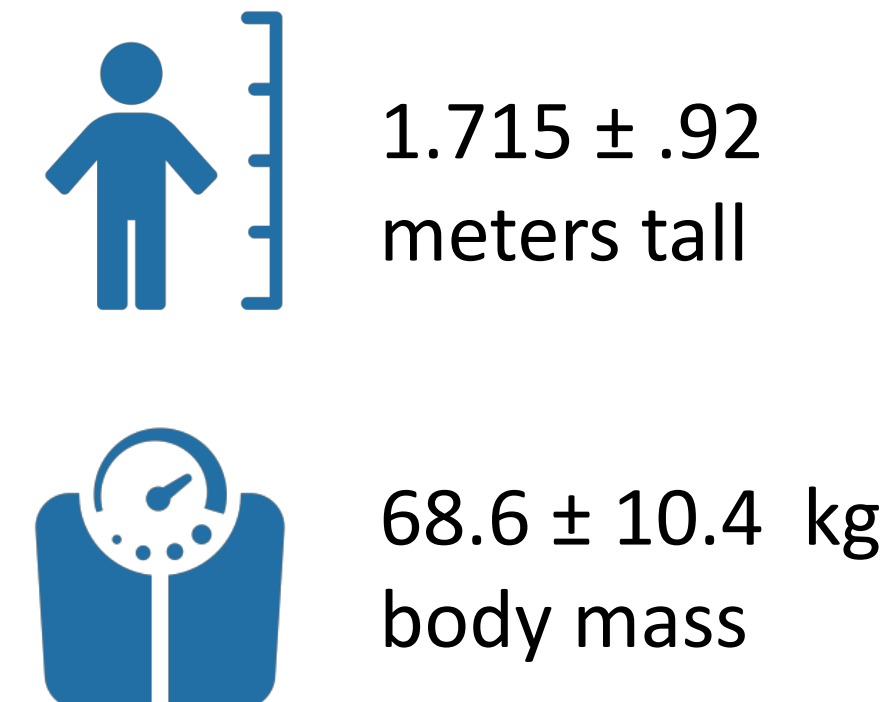
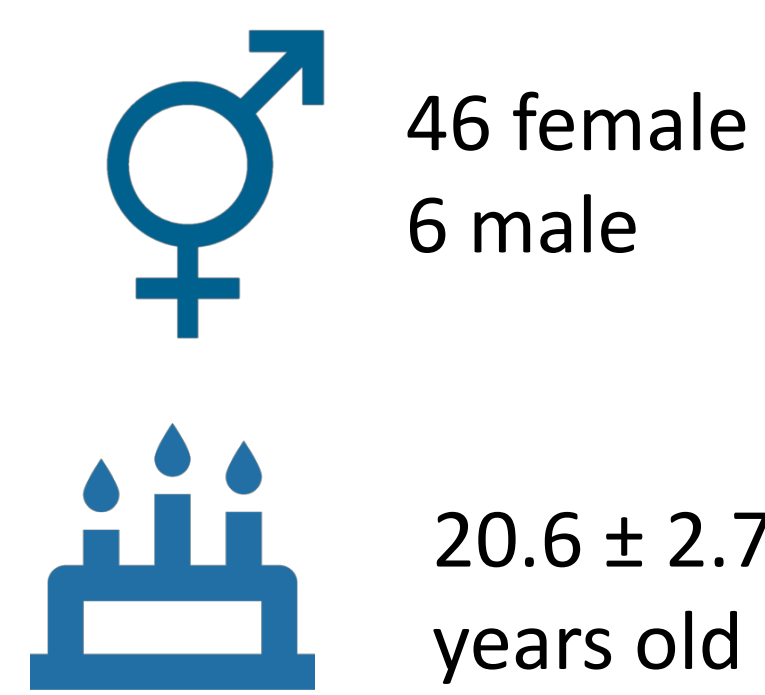
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## Introduction

- Previous research demonstrates that asymmetry in loading during a double limb drop vertical jump task is a risk factor for anterior cruciate ligament (ACL) injury. Individuals following ACLR continue to demonstrate asymmetries in loading, including those who successfully return to play.
- We would like to understand the variability in both the magnitude and **between-limb symmetry** of **peak vertical ground reaction force (vGRF)** and **peak vGRF loading rate (vGRF-LR)** in a healthy cohort, including the potential influence of **limb dominance**.
- The purpose of this study is to describe between limb differences in vertical ground reaction forces (vGRF) and loading rates (vGRF-LR) during a double limb landing task in a healthy cohort, including the peak vGRF and peak vGRF-LR normalized to body weight for the dominant and non-dominant limbs, as well as the limb symmetry indices (LSI) for peak vGRF and peak vGRF-LR

## Participants

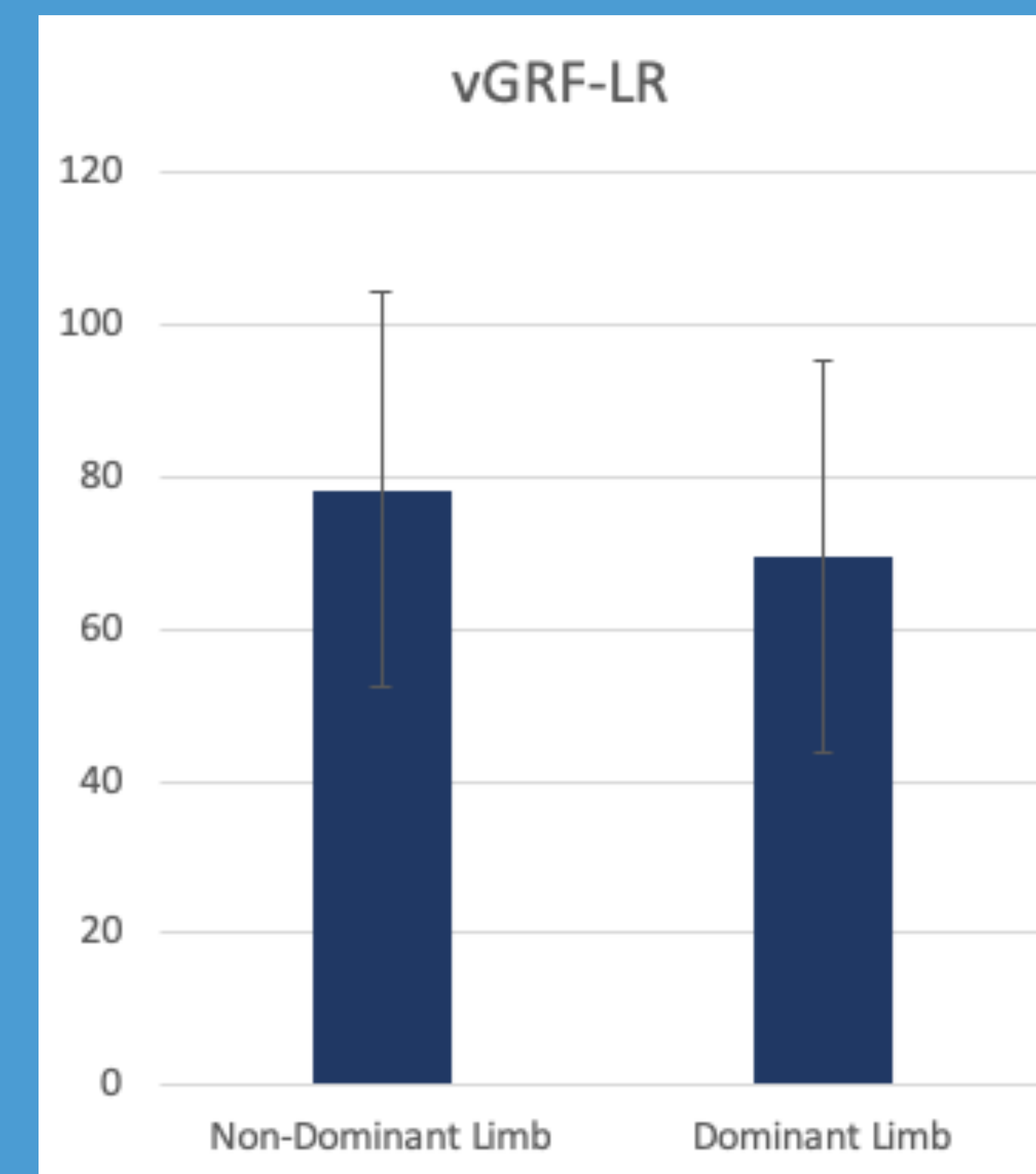
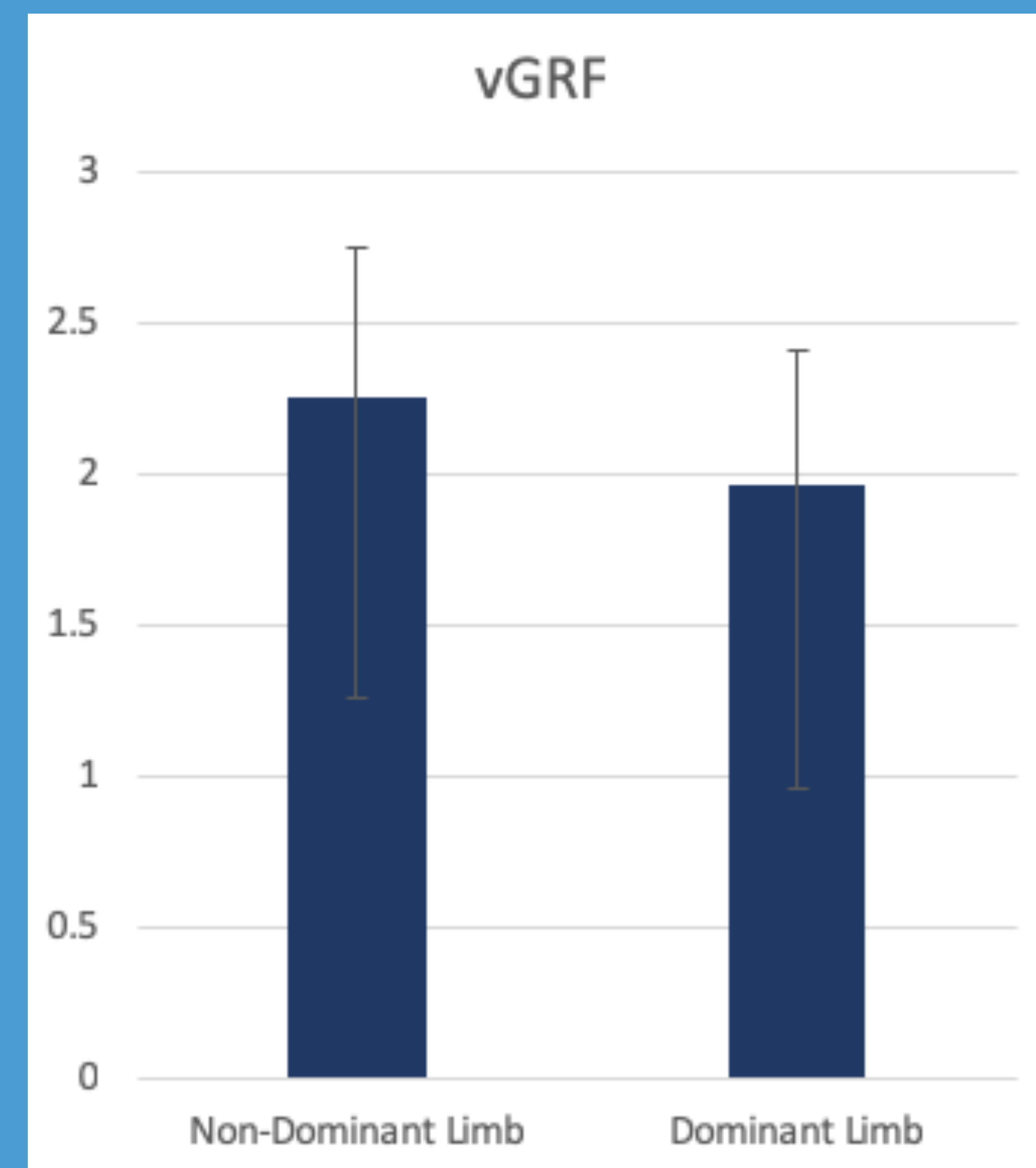
- 52 healthy subjects



## Methods

- Subjects completed 8 trials of a double limb drop vertical jump task while force plate data were collected.
- The **peak vGRF** and **peak vGRF-LR** (determined by the highest frame-to-frame difference in magnitude of vGRF) were extracted for each limb during each trial.
- Mean values were calculated for each participant for their self-reported dominant and non-dominant limbs.
- **Limb symmetry indices (LSIs)** were calculated as the non-dominant limb over the dominant limb multiplied by 100.

In healthy subjects, there is asymmetry between dominant and non-dominant limbs, with the non-dominant limb experiencing higher GRF variables.



## Analysis

- Descriptive analyses were performed to calculate the mean, standard deviation, and 95% confidence interval for each measure.
- Paired t-tests were performed between non-dominant and dominant limbs

## Results

Peak vGRF and Peak vGRF-LR

	Non-Dominant Limb	Dominant Limb	LSI	t-test
vGRF	2.26±0.49	1.96±0.45	88.3±12.8	p < 0.001
vGRF-LR	78.4±25.9	69.5±25.8	90.7±15.8	p < 0.001

## Conclusions and Clinical Relevance

- Our evidence suggests that healthy subjects do have asymmetry in GRF variables: the non-dominant limb undergoes higher peak vGRF and peak vGRF-LR compared to the dominant limb.
- The ranges reported in each limb may assist clinicians in identifying individuals outside normative ranges who could benefit from additional screening measures.



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