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

Alexa Cardoso, Courtney Chaaban, Taylor Pitsinger, Cortney Armitano-Lago, Spencer Cain, Adam Kiefer, Erik Wikstrom, Darin Padua

UNC Human Movement Science Curriculum

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

<table>
<thead>
<tr>
<th>Gender</th>
<th>Age</th>
<th>Height</th>
<th>Body Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>46 female</td>
<td>20.6 ± 2.7 years old</td>
<td>1.715 ± 0.92 meters tall</td>
<td>68.6 ± 10.4 kg body mass</td>
</tr>
<tr>
<td>6 male</td>
<td>20.6 ± 2.7 years old</td>
<td>1.715 ± 0.92 meters tall</td>
<td>68.6 ± 10.4 kg body mass</td>
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</tbody>
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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.

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.