

The Effect of Leg Dominance on Dynamic Postural Stability

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Introduction

- The Dynamic Postural Stability Index (DPSI) is a reliable and precise method to assess an individual's ability to transition efficiently from a dynamic to static state.^{1,2}
- The inability to transition efficiently from a dynamic to static state has been suggested to increase the risk of lower extremity injury.^{3,5,6}
- Only one study compared dominant leg (DL) versus non-dominant leg (NDL) DPSI values.³
- Research studies^{1,3} using DPSI typically analyze DL and NDL DPSI values separately because of potentially different jump-landing strategies associated with the DL and NDL.¹

Purpose

- To compare DL and NDL DPSI values to determine if there are significant differences in mean scores, which would support the theory of different jump-landing strategies associated with the DL and NDL and further justify the practice of examining DL and NDL values separately.



Materials and Methods

- 32 healthy and physically active volunteer subjects [16 males (19.8 ± 1.3 years, 85.6 ± 13.0 kg, 180.3 ± 8.9 cm) and 16 females (20.2 ± 1.0 years, 64.8 ± 20.4 kg, 165.2 ± 11.2 cm)].
- Each participant completed a warm up consisting of 2 minutes on a stationary bike at low resistance, 5 body weight squats, 5 anterior lunges per leg, and 5 lateral lunges per leg.
- 20 total jumps were performed by the participant in counterbalanced order, with each jump completed by landing on one leg on an Accupower portable force plate and stabilizing as quickly as possible with hands placed on hips.
 - 10 jumps performed in the anterior direction (5 landing on the DL and 5 landing on the NDL) over a 30 cm hurdle at a distance equal to 40% body height.
 - 10 jumps performed in the lateral direction (5 landing on the DL and 5 landing on the NDL) over a 15 cm hurdle at a distance equal to 33% body height.
- Ground reaction forces in the x, y, and z directions were sampled at 200Hz.
- DPSI values were calculated using the DPSI equation.⁴
 - $DPSI = [\Sigma(\{0-F_y\}/BW)^2 + \Sigma(\{0-F_x\}/BW)^2 + \Sigma(\{BW-F_z\}/BW)^2]/S$

Results

- Dependent t-tests revealed no significant differences between mean DPSI values in the forward and lateral directions respectively for the DL (0.35 ± 0.06; 0.31 ± 0.06) compared to the NDL (0.35 ± 0.05; 0.31 ± 0.05), with t-values in the forward direction $t(31) = -.43, p = .67, d = 0.05$ and lateral direction $t(31) = .15, p = .88, d = .03$.

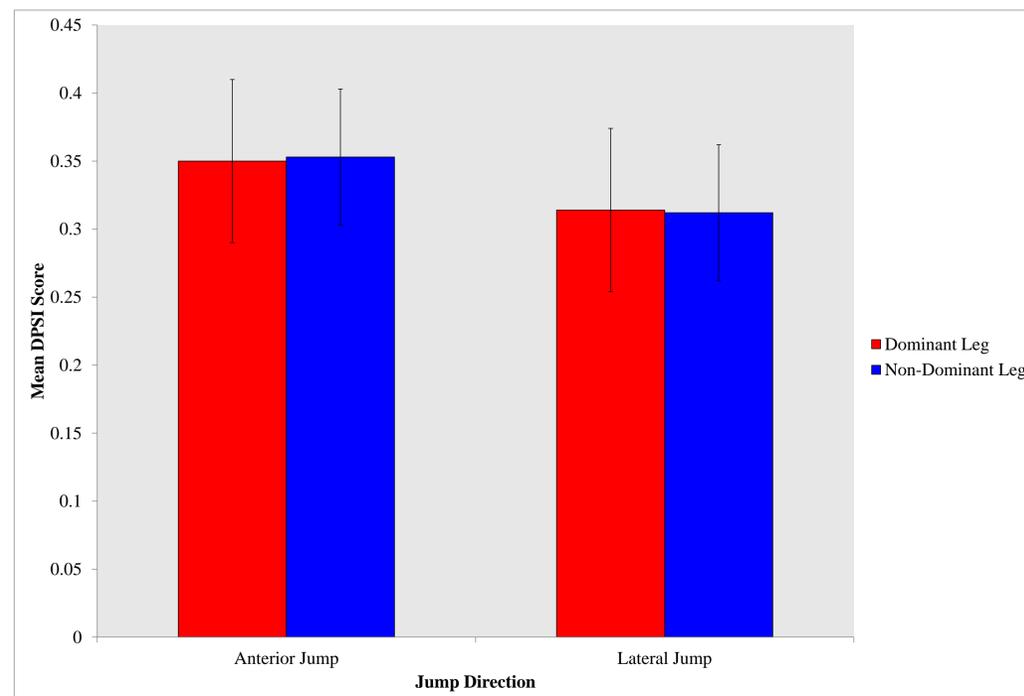


Figure 1: Mean DL and NDL DPSI scores associated with anterior and lateral jump landing trials.

Discussion

- It is common practice to compare DL and NDL DPSI values separately because it is believed that differences in leg dominance causes altered landing strategies between the two legs.³
- Consistent with previous research,³ no significant differences in DPSI values between the DL and NDL were found when landing from an anterior or lateral jump. Therefore, the practice of examining DL and NDL DPSI data separately may not be necessary.
- Determination of leg dominance based on leg preference for kicking a soccer ball may not be valid with regard to the DPSI. Other, more functionally relevant methods of determining leg dominance may be more appropriate.

Conclusion

- Non-significant differences in the means and the small effect sizes indicate that the DPSI values associated with DL and NDL when landing from an anterior and lateral jump are very similar.
- Examining DL and NDL separately may not be necessary when evaluating dynamic postural stability using the DPSI.

Literature Cited

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