

# Dynamic Postural Stability Index: Test-Retest Reliability When Landing from Three Types of Jumps

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## Introduction

- Dynamic Postural Stability Index (DPSI) assesses an individual's ability to maintain balance while transitioning from a dynamic state to a static state on a single leg.<sup>1,2</sup>
- DPSI is composite measure of landing forces in the medial-lateral, anterior-posterior, and vertical directions.<sup>1</sup>
- Control of dynamic posture promotes postural stability and is associated with enhanced athletic performance and prevention of sport related injury.<sup>3</sup>
- The test-retest reliability of the DPSI has only been examined when landing from jumps that combine vertical and forward movements.<sup>1</sup> However, the nature of sport activity often requires the athlete to perform a lateral or rotational movement prior to establishing dynamic postural stability.

## Purpose

- To examine the test-retest reliability of the DPSI when landing from jumps that emphasize either forward, lateral, or rotational movement.

## Methods

- Forty-two healthy college students (19 men and 23 women) active in club or intramural change of direction sports participated in the study.
- Subjects completed three types of jumps (forward, lateral, and 90 degree mid-air rotational) on three occasions (total of 9 jumps).
- Subjects jumped from their left leg, landing on their right leg; the jump distance was equivalent to 50% of their previously tested maximum jump distance for each jump.
- The jumps were completed on three occasions with 24- to 48-hours between test sessions.
- Subjects were instructed to land onto the center of an AccuPower® force platform, stabilize as quickly as possible without taking their hands off their hips or touching their left foot to their right leg, and balance for 3 seconds.
- Ground reaction forces in the x-, y-, and z-directions were sampled at 400 Hz for 3 seconds and used to calculate the DPSI.
- Data were analyzed using an intraclass correlation coefficient (ICC 3,1) formula.<sup>4</sup>

## Results

Table 1. Comparison of Dynamic Postural Stability Index scores for three jumps.

	Forward Jump	Lateral Jump	Rotational Jump
Mean DPSI	.0064	.0062	.0061
ICC (3,1)	.807*	.085	.753*
95% Confidence Interval	.678 to .890	-.531 to .478	.588 to .859
ICC Rating	Good	Poor	Fair
SEM	.00015	.00012	.00014

\*indicates significant results ( $p < .001$ )



Figure 1. Measuring 50% of maximum jump distance.

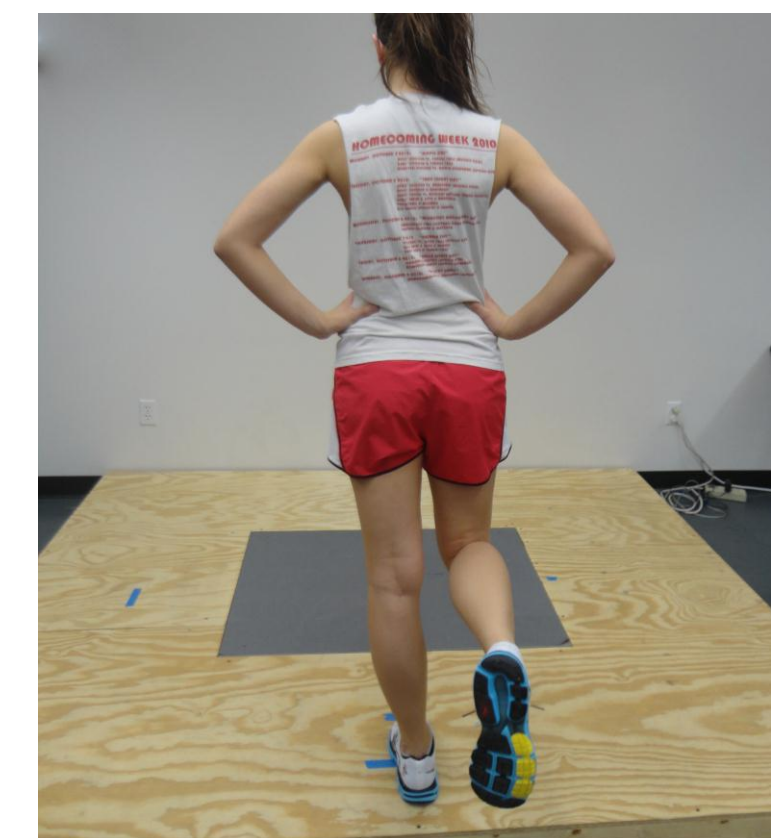


Figure 2. Start of a forward jump.

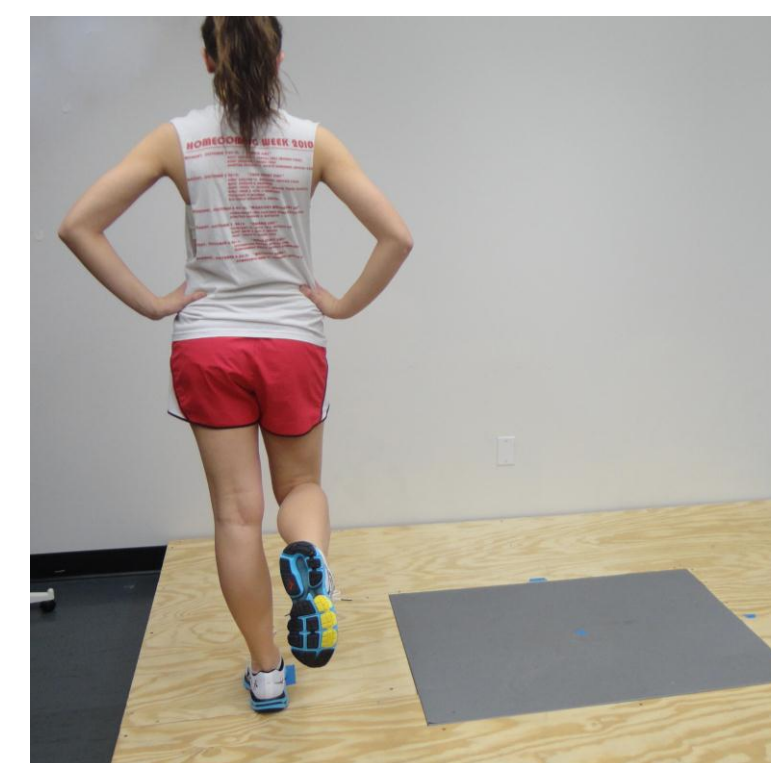


Figure 4. Start of a lateral jump.

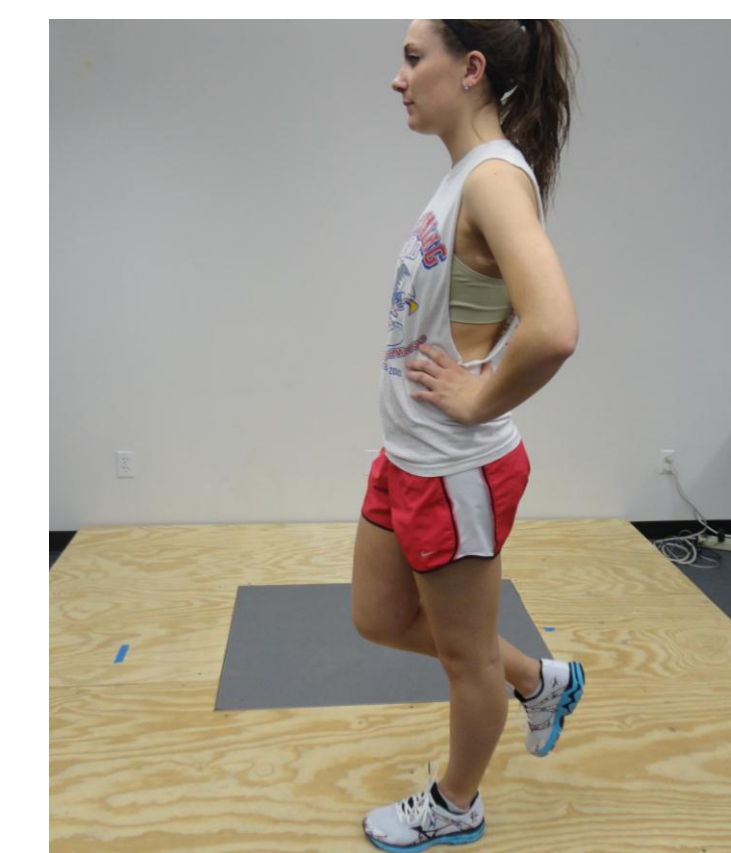


Figure 3. Start of a rotational jump.

## Future Research

- Assess the test-retest reliability of the DPSI when more sport-specific, near maximal jumps are performed.
- Examine the test-retest reliability of the DPSI with a shorter recording time, such as 400 milliseconds, consistent with the length of time the foot is on the ground during running and change of direction activities in sport.
- Examine the effect of footwear on the test-retest reliability of the DPSI when landing from different types of jumps.

## Conclusion

- The test-retest reliability of the DPSI is dependent on the direction of body movement performed prior to landing.
- DPSI is a reliable measure of dynamic postural stability when the jump prior to landing emphasized anterior and vertical body movement.
- DPSI is not a reliable measure of dynamic postural stability when the jump prior to landing emphasized lateral body movement.

## Literature Cited

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3. Ives, J. C. (2014). *Motor behavior: Connecting mind and body for optimal performance*. Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins.
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## Discussion

- The test-retest reliability of the DPSI is good when a forward jump is performed prior to landing, consistent with previous research.<sup>1</sup> However, the test-retest reliability of the DPSI is reduced when a 90 degree mid-air rotation is performed prior to landing and is severely reduced when a lateral jump, challenging frontal plane stability, is performed prior to landing.
- The reduced test-retest reliability of the DPSI with landing from rotational and lateral jumps limits the use of the DPSI in a clinical setting, particularly when assessing and tracking postural stability when more advanced postural stability training are utilized.