

The Hip Hinge Test: A Novel Test for Dynamic Hip Stability in Division I Athletes



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BACKGROUND

- Over 50% of injuries in athletic events occur in the lower extremity.^{1,2}
- Altered mechanics at the hip increase the risk of lower extremity injury – particularly at the knee.^{3,5}
- Hip stability is a primary focus of lower extremity injury prevention and rehabilitation.^{4,7}
- Tests developed to assess stability of the lower extremity, such as the Star Excursion Balance Test (SEBT), involve multiple joints, limiting the ability to determine where along the kinetic chain instability is occurring.⁶

OBJECTIVES

- Develop a dynamic stability test that isolates the hip from other lower extremity joints.
- Establish the inter-rater reliability of the Hip Hinge Test (HHT) for dynamic hip stability in Division I collegiate athletes.

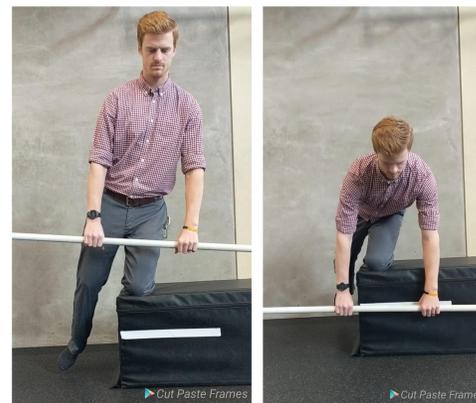
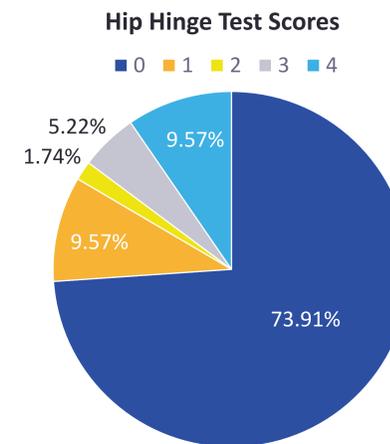
METHODS

- A collaborative meeting was held to develop the HHT. Test performance was outlined as follows:
 - The subject begins resting one knee on a plyometric box, holding a dowel shoulder-width apart, with arms resting at their sides.
 - The subject raises the opposite leg from the ground, attempting to balance for ten seconds.
 - Following ten seconds, the subject then bends forward at the waist, attempting to reach a line 6 inches below the level of the box and return to the starting position.
- See QR code in the results section for a video of test performance.
- A numeric grading scale was developed to assess performance of the athlete.
- 12 athletes were recruited from a Division I university to participate in the study.
- Participants were recorded and subsequently graded by five independent physical therapists of different experience levels.

RESULTS

- Inter-rater reliability was calculated by Intraclass Correlation Coefficient (ICC) using a single score two-way random effects model. Rater absolute agreement was moderate with an ICC of 0.65 (95% CI: 0.48, 0.80).
- Pooled data was used to calculate average test scores, with a total average score of 0.66 in the sample population.

	median (min, max)
Age (years)	20 (18, 22)
Height (inches)	68 (63, 77)
Weight (lbs)	155 (101, 290)
Sport Participation (years)	11 (8, 15)
Sport	% (n)
Track & Field	42% (5)
Wrestling	42% (5)
Volleyball	17% (2)



Scan this QR code to see a demonstration of the Hip Hinge Test.

Hip Hinge Test Grading Criteria

Grading Rubric	
0	Unable to maintain balance on single leg for 10 seconds
1	Maintains appropriate balance, unable to lower dowel
2	Able to lower dowel to box height without error
3	Able to lower dowel to 6 inches below box height without error
4	Able to return from 6 inches below box height to starting position with a 1 second pause after returning

Errors*

-	Any angle >30 degrees on the inclinometer
-	Contralateral leg ground or box contact during test performance
-	Hand or dowel contact on the box for support
-	Contacting hip to heel of balancing leg

**Any error during any phase of the test will result in a score of the highest score completed without error

CONCLUSIONS

- Inter-rater reliability was moderate for the HHT (0.65), which is comparable to ICC scores for the SEBT (0.35-0.93) found in the literature.⁸
- The HHT demonstrated a significant floor effect, where the majority of scores were 0 and 1 (73.91% and 9.57%, respectively).
- Several limitations in the study may have contributed to this floor effect:
 - The study was significantly underpowered due to limitations in subject recruitment following the COVID-19 pandemic.
 - Instruction to subjects prior to test performance did not emphasize avoiding all free limb contact with ground or box throughout the test performance.
 - Grading criteria required any free limb contact be reported as an error, whether or not it influenced the subject's ability to maintain balance.
 - Subjects were not instructed to pause upon returning to the start position.

FUTURE IMPLICATIONS

- Future research into the relationship between performance on the HHT and lower extremity injury may provide a predictive value to test performance.
- Comparing performance of the to the Star Excursion Balance Test and Lower Extremity Y-balance Test will establish the validity of this test for dynamic stability.

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