

BRICK PERFORMANCE

BIOMECHANICAL ASSESSMENT

Name: Ian Steiger

Range of Motion

When we consider range of motion, we are looking at asymmetries and deficiencies, but also how the length tension relationship affects the bone in the joint. Our gold standards are taken from various papers and research. We expect some variation from gold standard (up to 15%) but the data suggests that the closer you are to the gold standards, the less stress on the joint.

Ankle

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Dorsiflexion Range	20°	14°	30°	67%	47%	29.9%
Plantarflexion Range	117°	107°	165°	71%	65%	8.5%

Knee

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Flexion Range	96°	106°	160°	60%	66%	9.1%
Extension Range	175°	170°	170°	103%	100%	2.9%

Ribcage

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Ribcage Rotation	48°	36°	45°	64%	48%	25.0%
Ribcage Flexion	36°	36°	30°	65%	65%	0.0%

Hip

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Flexion Range	91°	87°	90°	101%	97%	4.0%
Extension Range	32°	30°	30°	107%	100%	6.5%
Abduction Range	53°	60°	55°	96%	109%	12.0%
Adduction Range	35°	33°	35°	100%	94%	6.0%
Ext Rotation Range	35°	45°	45°	78%	100%	22.0%
Int Rotation Range	44°	40°	40°	110%	100%	9.1%

Force

When we consider force, we are looking at asymmetries and deficiencies, but also how the length tension relationship affects the bone in the joint. Your percentiles are from your population group which factors in your age, gender and weight.

Posture Assessment

From the postural assessment we found some positive results as well as some areas we could concentrate on for improvement. Your forward head posture was measured at 4.8cm (normal is deemed 0-3cm). Your thoracic (upper back) curvature was above our gold standard range, you measured 56.0 degrees, normal is considered 30-35. We saw an increased curvature in your lumbar spine, you measured 36.0 degrees with normal being considered 30-35.

These readings indicate you have a sway back posture. So where your forward head posture is slightly increased we could expect increased levels of force and tension being applied to the discs and muscles of your cervical and thoracic spine (neck and upper back). An increased curve in your lumbar spine (lower back) this can be associated with worse force absorption and transference and therefore increased loading through the joints of the spine.

You were able to rotate your spine 48.0 degrees to the left and 36.0 degrees to the right, and could laterally flex (side bend) 36.0 degrees to the left and 36.0 degrees to the right.

The angle of pelvic tilt in quiet standing describes the orientation of the pelvis in the sagittal plane. It is determined by the muscular and ligamentous forces that act between the pelvis and adjacent segments. You were 7.0 (left) and 5.0 (right), normal is 4-7 degrees for males.

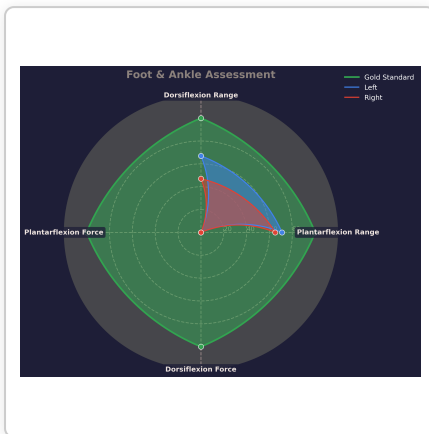
Core Assessment

The core function assessments primarily evaluate TVA strength, coordination, and multifidus activation. Your results indicate a slightly increased lumbar curvature, which is likely contributing to the observed reduction in lower abdominal strength.

While the Lower Abdominal Coordination Test was passed, it is important to note that the upper core demonstrated sufficient bracing capabilities, whereas the lower core struggled to brace effectively. This discrepancy suggests that there may be compensatory patterns at play, potentially involving the quadratus lumborum (QL) and lower back musculature attempting to compensate for the lower abdominal weakness.

To address these issues, we would like to teach you to use your deep lying core muscles, build their strength, and work on their coordination with a larger emphasis on your lower abdominals.

Ankle Assessment



The Left foot: Your left foot is positioned in a slightly everted state, with the center of mass located between the 1st and 2nd metatarsals. This positioning allows for effective pronation, and you demonstrated the ability to both pronate and supinate during assessment. However, specific details regarding the range and strength of dorsiflexion and plantarflexion were not provided, which are critical for a comprehensive evaluation. To enhance your foot function, we recommend prioritizing strength training through overcoming isometrics, focusing on building control and awareness in your movements.

The Right foot: The right foot mirrors the left, also presenting a slightly everted position with the center of mass between the 1st and 2nd metatarsals. Similar to the left, it can pronate and supinate effectively, indicating comparable movement capabilities. However, the lack of specific range and strength data for dorsiflexion and plantarflexion on this side suggests potential asymmetry that may need to be addressed.

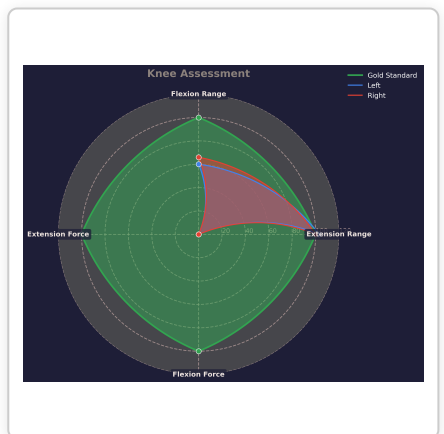
Foot and Ankle summary: While both feet exhibit similar everted positioning, the noted asymmetry indicates a need for targeted intervention. Key findings suggest that while both feet can articulate well, there may be discrepancies in strength and control that require attention. To address these issues, we recommend incorporating isometric exercises to build strength, particularly in plantarflexion, and enhancing proprioceptive awareness through dynamic movements. Additionally, focusing on midfoot articulation and fascial control during everyday activities will promote better overall foot function and alignment.

Knee Assessment

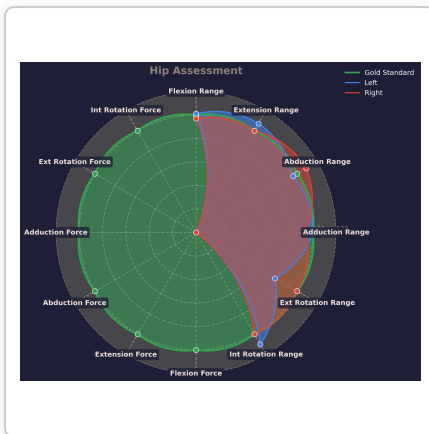
The Left knee achieved poor range in flexion, being 40% below our gold standard, indicating significant limitations in the distal hamstring. However, it demonstrated good range in extension, exceeding the gold standard by 3%. The strength data for the left knee is unknown, which limits our ability to assess its overall performance in flexion and extension.

The Right knee also exhibited poor range in flexion, 34% below the gold standard, but had sufficient range in extension, matching the gold standard. In terms of range comparison, the right knee was 10% stronger in flexion than the left, but without strength data, we cannot fully evaluate the functional implications of this difference.

Knee summary: Both knees show considerable deficits in flexion range, necessitating a focus on improving distal hamstring function. The left knee demonstrates good extension range, while the right knee is sufficient. The hamstring to quadriceps ratio is good on the left but poor on the right, highlighting the need for targeted interventions to enhance strength and range in both knees, particularly in flexion.



Hip Assessment



The Left hip showed excellent range in hip flexion and extension, exceeding the gold standard, but exhibited a deficit in external rotation. The unknown strength metrics limit the analysis of force production, but the range deficits in external rotation may compromise movement patterns and hip joint integrity.

The Right hip demonstrated sufficient range in hip flexion and extension, but it fell short of the gold standard in hip abduction and internal rotation. While the right side showed above gold standard range in hip abduction, the deficits in external rotation and the unknown strength metrics suggest potential issues with propulsion and overall force production.

Hip summary: The notable range deficits in external rotation on the left side could impact pelvic alignment and hip joint integrity. The inverse relationship in range of motion between internal and external rotation highlights changes in femur positioning, which is crucial for maintaining stability during functional activities. Addressing these range deficits and understanding the unknown strength metrics will be essential for optimizing movement patterns and ensuring effective energy transfer during both closed and open-chain movements. Reducing the current asymmetry present at the hip will be vital for improving overall function.

Conclusion

Our results indicate you have a Sway Back Posture. This posture is characterized by a posterior pelvic tilt and a forward shift of the thorax, which can lead to a range of compensatory patterns throughout the body. The alignment of the rib cage may be affected, potentially resulting in a depression of the rib cage and altered shoulder positioning. This posture can also influence the dynamics of gait, as the pelvis and spine may be required to compensate for the misalignment, leading to further biomechanical inefficiencies.

There are notable compensations occurring at the hip, particularly with deficits in external rotation on the left side. The largest range variation observed was in hip internal/external rotation, highlighting significant changes in femur positioning. This inverse relationship in range of motion suggests that limitations in one direction may be affecting overall hip function and contributing to compensatory strategies during movement.

In terms of integration, both knees exhibit deficits in flexion, which may impact overall joint articulation and muscle contraction quality. Addressing these range of motion improvements will be crucial for enhancing tissue loading efficiency and ensuring that the joints can function optimally without excessive force discrepancies.

Regarding the ankle, both feet are positioned in a slightly everted state, with the center of mass located between the 1st and 2nd metatarsals. While both feet demonstrate effective pronation and supination, the lack of specific range and strength data for dorsiflexion and plantarflexion suggests potential asymmetries that may need to be addressed. To enhance foot function, we recommend prioritizing strength training through overcoming isometrics, focusing on building control and awareness in your movements. Additionally, incorporating isometric exercises to build strength, particularly in plantarflexion, and enhancing proprioceptive awareness through dynamic movements will promote better overall foot function and alignment.

Please book in a call so we can talk through your findings and get you back to pain free performance.

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