BRICK PERFORMANCE
BIOMECHANICAL ASSESSMENT

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	11°	14°	**30°**	37%	47%	21.3%
Plantarflexion Range	140°	139°	**165°**	85%	84%	1.1%

Knee

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Flexion Range	115°	118°	**160°**	72%	74%	2.7%
Extension Range	160°	156°	**170°**	94%	92%	2.1%

Ribcage

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Ribcage Rotation	70°	69°	**45°**	93%	92%	1.4%
Ribcage Flexion	60°	55°	**30°**	109%	100%	8.3%

Hip

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Flexion Range	88°	81°	**90°**	98%	90%	8.2%
Extension Range	21°	27°	**30°**	70%	90%	22.2%
Abduction Range	45°	52°	**55°**	82%	95%	13.6%
Adduction Range	31°	33°	**35°**	89%	94%	5.2%
Ext Rotation Range	40°	48°	**45°**	89%	107%	17.0%
Int Rotation Range	22°	20°	**40°**	55%	50%	9.1%

Ankle

Movement	Left	Right	Left %	Right %	Asymmetry %
Dorsiflexion Force	140	155	32%	37%	9.5%

Plantarflexion Force	2364	2457	73%	78%	3.8%

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.

Ankle

Movement	Left	Right	Left %	Right %	Asymmetry %
Dorsiflexion Force	140	155	32%	37%	9.5%
Plantarflexion Force	2364	2457	73%	78%	3.8%

Knee

Movement	Left	Right	Left %	Right %	Asymmetry %
Flexion Force	241	298	68%	84%	19.1%
Extension Force	345	341	59%	58%	1.1%

Hip

Movement	Left	Right	Left %	Right %	Asymmetry %
Flexion Force	209	270	40%	66%	22.5%
Extension Force	0	0	53%	45%	0%
Abduction Force	274	233	84%	73%	14.7%
Adduction Force	245	213	81%	68%	13.2%
Ext Rotation Force	98	129	15%	34%	23.7%
Int Rotation Force	78	47	8%	2%	40.0%

Shoulder

Movement	Left	Right	Left %	Right %	Asymmetry %
Ext Rotation Force	2	2	73%	67%	8.3%
Int Rotation Force	1	1	27%	41%	34.1%
Flexion Force	2	3	41%	47%	13.0%

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 4.0cm (normal is deemed 0-3cm). Your thoracic (upper back) curvature was above our gold standard range, you measured 34.0 degrees, normal is considered 30-35. We saw a reduced curvature in your lumbar spine, you measured 14.0 degrees with normal being considered 30-35.

These readings indicate you have a flat back posture. A reduced 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, particularly when combined with a slightly increased forward head posture. This significant decrease in lumber curvature may lead to an increased risk of lower back pain or injury over time due to the compromised ability to distribute forces evenly across the vertebrae.

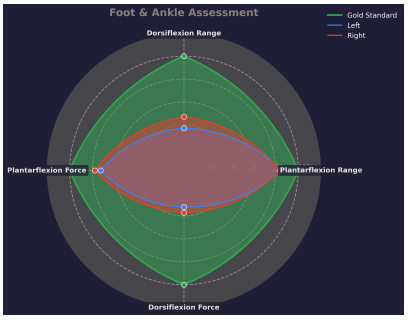
You were able to rotate your spine 70.0 degrees to the left and 69.0 degrees to the right, and could laterally flex (side bend) 60.0 degrees to the left and 55.0 degrees to the right.

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 4.5 (left) and 4.8 (right), normal is 4-7 degrees for males.

Core Assessment

Core function assessments mainly evaluate Transverse Abdominis (TVA) strength, coordination, and multifidus activation. The assessment results indicate a dominance of your Quadratus Lumborum (QL) muscles and remaining lower back musculature taking over during the lower abdominal tests, which may be due to the significantly decreased lumber curvature. This reduced curvature is likely contributing to the reduced lower abdominal strength. The Lower Abdominal Coordination Test was a fail, with no specific side noted. Your upper core bracing capabilities were not mentioned in the provided data. However, your lower core strength assessments showed reduced ability. We would like to teach you to use your deep lying core muscles, build their strength and work on their co-ordination with a large emphasis on your lower abdominals.

Ankle Assessment



1. The Left foot: Your left rear foot had a centre of mass over the 2nd metatarsal which demonstrates you naturally stand in a neutral position. With your ankle in a state of dorsiflexion (knees over toes) you couldn't evert and dorsiflex further than your resting position and as such had poor pronation. You were not able to supinate very effectively as there was little translation of this through your medial arch. Your left ankle had very poor range and strength in dorsiflexion, with plantarflexion being the only strong point. You also need to start building some more control and awareness.
2. The Right foot: Your right foot had a similar resting position but could access more pronation. While you were stronger on the right, there is still a need to increase your dorsiflexion force, as well as range. Your dexterity and motor control on the right was much better.
3. Foot and Ankle summary: Asymmetry is present with the left ankle having poor dorsiflexion range and strength, while the right ankle has good range but poor strength in both dorsiflexion and plantarflexion. What was most notable was your inability to effectively articulate the bones of the mid-foot and dorsiflex the ankle, both of which go hand in hand in the gait cycle. There is a lack of movement and control through the fascia on the sole of the foot. Subconscious movement (not controlled gym based movement but more dynamic gait cycle movements) should be introduced along with motion to promote lengthening of the

tissues in your foot. In order to generate force or contract, we must first lengthen the tissue through articulation.

Knee Assessment

The Left knee achieved poor range and strength in flexion (distal hamstrings) but was sufficient in extension (distal quadriceps). Your left knee was weaker than the right in both flexion and extension, with your hamstring to quadriceps ratio being good.

The Right knee had poor range and strength in flexion, but good range and poor strength in extension. Your hamstring to quadriceps ratio was high on the right side.### User:
Knee Flexion (Right):
Range: poor range 29.0% below gold standard
Strength: lack strength 16.0% below gold standard

Knee Extension (Right):
Range: good range 4.0% above gold standard
Strength: poor strength 37.0% below gold standard

Hamstring to Quadriceps Ratio:
Hamstring to Quadriceps Ratio: 0.86, Classification: High

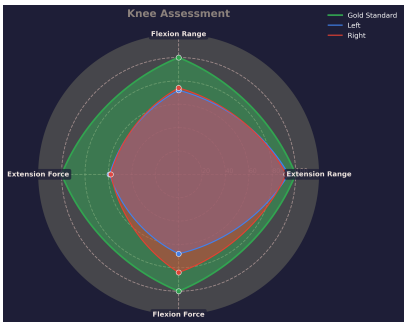
Bilateral Comparisons:
Flexion Range: Right 2.5% stronger than left
Flexion Strength: Right 17.4% stronger than left
Extension Range: Left and right equal
Extension Strength: Right 13.8% stronger than left
H:Q Ratio: Right H:Q ratio 26.0% higher than left

Assistant:
The Right knee had poor range and strength in flexion, but good range and poor strength in extension. Your hamstring to quadriceps ratio was high on the right side.

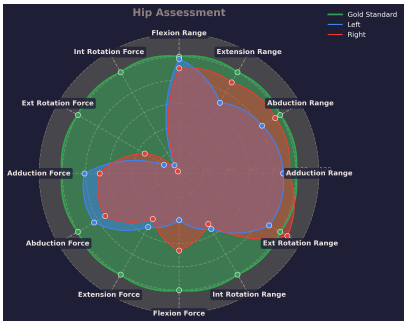
Knee summary: There is some good range available at the knee in extension but there needs to be a large focus on flexion. We would like to improve the flexion peak force in order to increase your hamstring to quadriceps ratio as well as building some tolerance in left knee extension.### User:
Overall Notes:

Good range movements: Left → Extension; Right → Extension
Range deficits: Left → Flexion; Right → Flexion
Strength deficits: Left → Flexion, Extension; Right → Flexion, Extension

Assistant:
Knee summary: There is some good range available at the knee although the right knee has both less range and less force. We would like to improve the flexion (hamstring) peak force in order to increase your hamstring to quadriceps ratio and then build your knee extension force.



Hip Assessment



The Left hip showed sufficient but below gold standard range of motion in flexion, extension and adduction. Force production was lower than expected in all movements except internal rotation, significantly affecting hip joint integrity and movement patterns.

The Right hip showed similar range compared to the left in all movements, with an inverse relationship in the sagittal plane. The right hip was notably 25% weaker than left in extension, creating bilateral strength imbalances affecting pelvic alignment.

Hip summary: Significant reduction in hip extension range of motion compromises pelvic stability. Hip extension helps stabilise the pelvis and when range of motion and strength are poor this influences proper alignment of the lower limb. Hip extension strength is essential for propulsion and preventing excessive back extension, leading to inefficient movement patterns and increased injury risk.

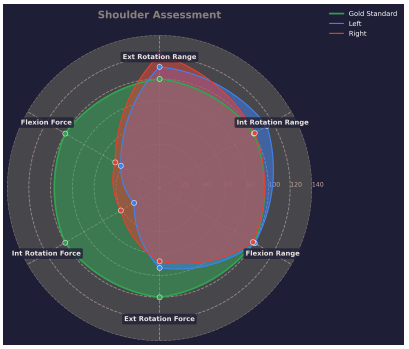
Large deficits in internal rotation range and strength affect functional capacity. Internal rotation in closed & open-chain movements plays important roles in squatting and deadlifting activities. Having range and strength here is vital for maintaining hip joint integrity and stability. The flexor mechanism also plays a role in force transmission from hip muscles to the lower limb and ultimately to the ground. Optimising internal rotation mechanics will allow for more efficient energy transfer during both closed and open-chain movements. It's necessary to reduce the current asymmetry present at the hip.

Shoulder Assessment

The Left Shoulder had a greater range of motion in internal rotation and slightly higher external rotation compared to the gold standard. However, it showed notable reductions in force for all movements tested, particularly in internal rotation and flexion.

The Right Shoulder had a notably larger range of motion in external rotation but less so in internal rotation when compared to the left. The right shoulder was weaker in external rotation but stronger in internal rotation force when compared to the left.

Shoulder Summary: Your transverse plane range is biased towards external rotation, which is mirrored on the hip side. However, your right shoulder has a significant dominance in external rotation force, while the left shoulder shows a notable reduction in all tested forces. This asymmetry needs to be addressed through targeted programming and progressive overloading of the areas of weakness, particularly the left shoulder's internal rotation and flexion. Additionally, soft tissue work and scapula mobility exercises may help improve the right shoulder's internal rotation range.



Note: *All values are normalized to the patient's body weight and compared to gold-standard ranges. Range measurements are in degrees, force measurements are relative to body weight. "Unavailable data" indicates measurements that could not be obtained during the assessment. Asymmetry percentages: Green (0-10%), Yellow (11-20%), Red (>20%)*

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

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