BRICK PERFORMANCE
BIOMECHANICAL ASSESSMENT

Name: Jordan Ferguson

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	28°	26°	**30°**	93%	87%	6.5%
Plantarflexion Range	147°	147°	**165°**	89%	89%	0.0%

Knee

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Flexion Range	154°	152°	**160°**	96%	95%	1.0%
Extension Range	163°	167°	**170°**	96%	98%	2.0%

Ribcage

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Ribcage Rotation	61°	63°	**45°**	81%	84%	3.2%
Ribcage Flexion	52°	53°	**30°**	95%	96%	1.9%

Hip

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Flexion Range	92°	91°	**90°**	102%	101%	1.0%
Extension Range	22°	23°	**30°**	73%	77%	5.2%
Abduction Range	62°	68°	**55°**	113%	124%	8.9%
Adduction Range	35°	42°	**35°**	100%	120%	16.7%
Ext Rotation Range	62°	52°	**45°**	138%	116%	15.9%
Int Rotation Range	29°	39°	**40°**	73%	98%	25.5%

Ankle

Movement	Left	Right	Left %	Right %	Asymmetry %
Dorsiflexion Force	302	339	88%	93%	11.0%
Plantarflexion Force	1556	1637	63%	69%	5.0%

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	302	339	88%	93%	11.0%
Plantarflexion Force	1556	1637	63%	69%	5.0%

Knee

Movement	Left	Right	Left %	Right %	Asymmetry %
Flexion Force	277	281	60%	62%	1.4%
Extension Force	419	455	52%	61%	8.0%

Hip

Movement	Left	Right	Left %	Right %	Asymmetry %
Flexion Force	283	321	61%	73%	11.9%
Extension Force	0	0	66%	71%	0%
Abduction Force	162	213	42%	72%	24.0%
Adduction Force	296	279	92%	89%	6.0%
Ext Rotation Force	230	242	88%	90%	5.3%
Int Rotation Force	280	331	94%	100%	15.4%

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 6.1cm (normal is deemed 0-3cm). Your thoracic (upper back) curvature was above our gold standard range, you measured 49.0 degrees, normal is considered 30-35. We saw an increased curvature in your lumbar spine, you measured 37.0 degrees with normal being considered 30-35.

These readings indicate you have a sway back posture. So where your forward head posture is 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 better force absorption and transference and therefore decreased loading through the joints of the spine.

You were able to rotate your spine 61.0 degrees to the left and 63.0 degrees to the right, and could laterally flex (side bend) 52.0 degrees to the left and 53.0 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 7.0 (right), normal is 4-7 degrees for males.

Core Assessment

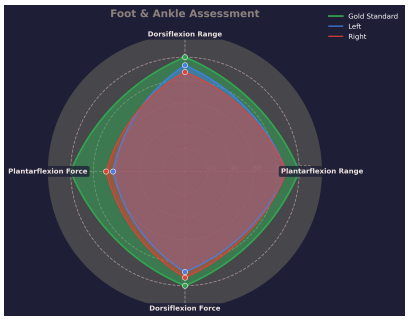
The core function assessments primarily evaluate TVA strength, coordination, and multifidus activation. Your results indicate a slightly increased lumbar curvature, which is likely contributing to the observed reduction in lower abdominal strength.

The Lower Abdominal Coordination Test resulted in a fail, suggesting that there may be compensatory patterns present, potentially involving the quadratus lumborum (QL) and lower back musculature, which may be attempting to compensate for the lack of coordination in your lower abdominals.

While your upper core demonstrated sufficient bracing capabilities, your lower core did not exhibit efficient bracing. This discrepancy highlights a potential weakness in the deep core muscles, particularly the lower abdominals, which are crucial for maintaining stability and proper function.

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 at the 0th metatarsal. This positioning allows for effective pronation and supination capabilities. The dorsiflexion range and strength are both satisfactory, indicating good mobility, while plantarflexion demonstrates good range but lacks strength. To address this, we should prioritize building strength through isometric exercises, alongside enhancing your control and proprioceptive awareness.

The Right foot: The right foot mirrors the left in its slightly everted position, also with the center of mass at the 0th metatarsal. Both feet exhibit comparable movement capabilities, with the ability to pronate and supinate effectively. However, the right foot shares the same strength deficiency in plantarflexion, similar to the left.

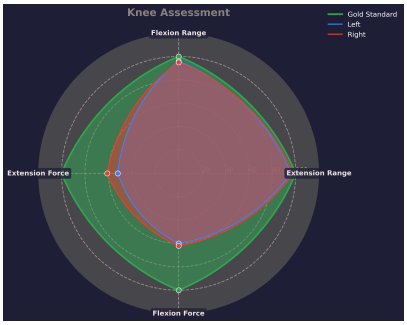
Foot and Ankle summary: There is a noticeable asymmetry between your feet, despite their similar everted positioning. While both feet demonstrate good dorsiflexion range and strength, the weakness in plantarflexion strength is a key finding that requires attention. To address this asymmetry, we recommend a focused approach on isometric strengthening for plantarflexion, along with exercises to enhance midfoot control and fascial awareness. Incorporating dynamic movements that promote subconscious engagement of the foot and ankle during daily activities will also be beneficial in improving overall function and strength.

Knee Assessment

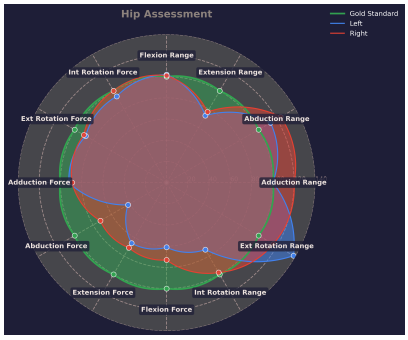
The Left knee achieved sufficient range in both flexion and extension, being 4% below the gold standard in each. However, the left knee exhibited poor strength in both flexion and extension, with flexion strength being 40% below the gold standard. Interestingly, the left knee's hamstring to quadriceps ratio is classified as good, indicating a relatively balanced strength between the distal hamstring and distal quadriceps despite the overall strength deficits.

The Right knee also demonstrated sufficient range in flexion and extension, with flexion being 5% below and extension 2% below the gold standard. The right knee was stronger than the left in both flexion and extension, with flexion strength 38% below the gold standard and extension strength 39% below. The right knee's hamstring to quadriceps ratio is also classified as good, although it is slightly lower than that of the left knee.

Knee summary: Both knees show sufficient range but significant strength deficits in flexion and extension. The good hamstring to quadriceps ratios on both sides suggest a relative balance in muscle strength, but overall strength improvements are necessary to enhance knee function and stability. Focus should be placed on increasing peak force in both flexion and extension to address the strength deficits observed.



Hip Assessment



The Left hip showed excellent range in flexion and abduction, but significant deficits in hip extension and internal rotation. The large deficits in strength across flexion, extension, and abduction indicate compromised force production, which negatively impacts movement patterns and overall hip joint integrity.

The Right hip demonstrated similar range of motion to the left, particularly excelling in hip abduction. However, it also exhibited deficits in hip extension and internal rotation, with strength deficits in flexion, extension, and abduction. The notable asymmetry, particularly in hip abduction, suggests an imbalance that could affect propulsion and stability during movement.

Hip summary: The large deficits in hip extension range on both sides compromise pelvic alignment and stability, which are crucial for effective propulsion and movement efficiency. The strength deficits in flexion, extension, and abduction on both sides further exacerbate these issues, leading to inefficient movement patterns. The significant asymmetries, especially in hip abduction and internal rotation, highlight the need for targeted interventions to improve hip joint integrity and optimize energy transfer during functional activities. Addressing these deficits will be essential for enhancing overall hip function and reducing the risk of injury.

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 biomechanical issues. The sway back position often results in an increased thoracic kyphosis and a depression of the rib cage, contributing to an externally rotated position of the shoulders. This alignment can have significant consequences during gait, as it may affect the efficiency of movement and overall stability.

There are notable compensations occurring at the hip, particularly with deficits in extension and internal rotation on the left side, and extension on the right. Strength deficits in flexion, extension, and abduction are present bilaterally, with the largest range variation observed in hip internal/external rotation on the left side, indicating changes in femur positioning. These limitations suggest that the spine may be compensating for the lack of hip function, which can lead to overuse and potential injury.

In terms of integration, both feet exhibit a slightly everted position with the center of mass at the 0th metatarsal, allowing for effective pronation and supination capabilities. While dorsiflexion range and strength are satisfactory, there is a notable deficiency in plantarflexion strength on both sides. This asymmetry highlights the need for a focused approach on isometric strengthening for plantarflexion, alongside enhancing midfoot control and proprioceptive awareness. Incorporating dynamic movements that promote subconscious engagement of the foot and ankle during daily activities will also be beneficial in improving overall function and strength.

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

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