Musculoskeletal Screening Tests for Rowers

These tests are for administration by physiotherapists using the NRCE Musculo-skeletal Screening protocol

Active knee extension

This test is used to assess the length of the hamstring muscle group and its associated tissues. This test is thought to be a more reliable and valid measure of hamstring length than SLR.

The subject lies supine on the plinth without a pillow. The tester passively flexes the hip until the thigh is vertical. This is determined using a spirit level goniometer or inclinometer with reference to a line from the greater trochanter to the lateral epicondyle. The subject is then asked to hold the posterior thigh in order to maintain the thigh in the vertical position. The opposite leg is maintained in full extension during the test. The subject is then asked to extend the knee of the test leg until the thigh begins to move from the horizontal, whilst maintaining foot and ankle relaxation. In cases where full knee extension is achieved without thigh movement, the knee is flexed and the thigh moved to 30^{o} past the vertical position, using the same determination method as mentioned earlier. The process of knee extension is then repeated until thigh movement occurs. The tester records the angle from complete knee extension, by comparing a line along the tibia, running from the inferior border of the lateral malleolus to the head of the fibula, with respect to the vertical. Flexion values are recorded as negative. In cases where the hip is further flexed to 120^{o}, the measurement is recorded as 120 –x.

BENCHMARK: Knee Extension = -10^{o}

Sit and Reach Test

This test is commonly used to measure combined spinal and hamstring muscle extensibility.

The subject is required to sit on the ground with their knees fully extended and the soles of their feet contacting a rigid box, which has a ruler attached to the superior surface. The subject is asked to stretch forward as far as possible and to hold that position for one second, whilst maintaining one hand directly on top of the other. Each subject is allowed two attempts, with the best score being recorded. A positive score for the sit and reach test indicated that the tips of the subjects fingers reached past the subject's toes, while a negative score indicated that the player could not reach their toes.

Note:

The reference does not specify the height of the sit and reach box. Based on measurements of existing structures, I believe that this should be set at 40cm from floor to top of the box.

BENCHMARK: Sit & Reach Measure = 10cm

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Ankle dorsiflexion (weight bearing)

This test is used to assess the range of ankle dorsiflexion in a functional position.

The athlete is asked to stand in stride stand (test leg forward and non test leg back) with bare feet. The athlete is asked to bend their knee forward in line with the second toe until heel contact decreases or pain is experienced in or around the ankle joint. The aim is for the athlete's knee to contact the wall without heel contact decreasing. The tester records the distance from the big toe to the wall. Allow the athlete to adopt their normal sub talar position.

BENCHMARK: Ankle Dorsiflexion = +12cm, plus right and left within 2 cm of each other.

Hip flexion

This test is designed to assess the available range of coupled hip flexion and pelvic rotation. Pelvic rotation has been shown to accompany both active and passive hip flexion, and commences in the first 80^{o} of motion.

The athlete is lying supine on a plinth. The therapist passively flexes the hip with knee flexed until the point of pelvic rotation. This is palpated for either on the ASIS or sacrum depending on therapist preference. The therapist records the degree of hip flexion relative to the horizontal using a spirit level goniometer centred over the greater trochanter.

BENCHMARK: Hip Flexion = 130^{o}

Active Slump Test

This test is used to assess the mobility of pain sensitive neuromeningeal structures.

In the sitting position, the participant is asked to fully flex the cervical spine, followed by the thoracic and lumbar spines. Next, full dorsiflexion of the ankle is requested and the participant is asked to extend their knee until they feel a stretch or some discomfort. In this position, the angle between the horizontal and the tibia (knee flexion) is measured using an inclinometer. The inclinometer was placed on the anterior tibial border at a distance 15cm below the mid-point of the tibial tuberosity.

BENCHMARK: Knee Extension = -20^{o}

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Modified Thomas Test

This test is used to assess the flexibility of the hip flexors (iliopsoas predominantly), quadriceps and TFL/ITB.

The participant sat on the end of the plinth, rolled back on to the plinth, and held both knees to the chest. This ensured that the lumbar spine was flat on the plinth and the pelvis was in posterior rotation. The therapist then uses external rotation of the non test leg to align the pelvis square to the leg to be tested. The subject holds the contralateral hip in this position with the arms, while the tested limb was lowered towards the floor.
Three angles were measured for each limb and were repeated on each limb. Length of iliopsoas (test 1) was determined by measuring the angle of hip flexion. Test 2 measured the passive length of the quadriceps by determining the knee flexion angle. The hip abduction angle relative to the femur and angle of the pelvis represents the effect of TFL / ITB flexibility.

BENCHMARK: Hip Extension = $+5^{o}$

Thoracic Rotation

The athlete is sitting on the plinth with a neutral spine. Both thighs are positioned on towels if needed to ensure a horizontal femur. The athlete places both hands together with arms straight directly in front of their chest, hands and arms at shoulder height. The athlete is then asked to rotate the arms as far as possible, so that the thoracic spine rotates. The athlete is asked to keep their nose, head and hands in line. The therapist measures from above the angle of a line from nose to hands compared to the start position.

BENCHMARK: Thoracic Rotation = $+60^{o}$

Hip Internal Rotation

The athlete is sitting on the plinth with a neutral spine. Both thighs are positioned on towels if needed to ensure a horizontal femur. The therapist internally rotates the shin of the test leg until the end of range is felt, or the pelvis begins to lift. The therapist records the angle of the tibia using an inclinometer placed along the medial tibia.

BENCHMARK: Hip Internal Rotation = $+25^{o}$

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Pop Pull Test

For this test use black theraband 1m in length from knot to knot. The athlete is positioned on a chair in slightly forward flexed position with opposite arm resting on thigh. Position the chair/athlete so the band is on stretch to a length of 1.5m, the arm is fully extended and the scapula protracted. The athlete is asked to maintain his lower body and back position while pulling the band back at a slow/moderate speed until his hand is level with his chest – repeat 10 times

If the athlete initiates the movement with scapula retraction and elbow flexion at the same time this is a –ve result

If the athlete initiates the movement with elbow flexion and the shoulder 'pops' forward or up this is a +ve result

Watch end of pull position for additional comments regarding the movement pattern ie hitching.


Start position


Finish Position

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