



PREVENTION & REHABILITATION: PRACTICAL EXERCISE SEQUENCE

The Double Knee Swing Test – a practical example of The Performance Matrix Movement Screen



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Summary Movement screens have been suggested as an appropriate tool to identify 'uncontrolled movement' within the human neuromusculoskeletal system. Movement screens test the Central Nervous System along with the muscular system, for their combined ability to successfully control low threshold forces, such as those affecting posture and alignment, or, high threshold forces, such as those requiring muscular strength to control. Further information such as the identification of an anatomical site and direction of a potential uncontrolled movement can be elicited by this type of testing. This paper describes a low threshold, movement screen test, designed to be part of a battery of tests, which when used as a whole, can identify injury risk or factors affecting performance limitations. The testing is suggested to be a suitable assessment tool for Pilates Teachers working in a rehabilitative environment.

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The editorial of this Prevention and Rehabilitation section of this Journal highlights the opinion that the use of movement screening may be useful in the prediction of re-injury risk (Mottram and Comerford, 2008) but also that movement screening could prove useful for Pilates Teachers who work within the sphere of rehabilitation of low back pain sufferers, as a movement screen may help objectively to find subgroups of individuals with specific movement control failures so that equally specific exercise

can be applied to the movement faults found. The editorial also suggests that two disciplines, circus and dance, already well known for their training that highlights movement control, balance, and strength are attempting to put into practice further movement control fundamentals by keeping abreast of new scientific thought. It was suggested in the editorial that adding Movement screening into the more generalised screens already in place may help tighten that focus still further by finding the actual movement faults requiring attention.

'The Performance Matrix' is an umbrella of movement screens designed specifically for an activity or sport, taking into account the injuries typical of the activity and the

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movement peculiar to that activity. This means a new screen can be individualised to an activity. Some tests could be chosen from a bank of tests already created or a new specific test could be developed and incorporated.

Another element of specificity is that the testing procedure looks at three factors within movement control. The anatomical site, the direction of movement and the threshold of muscular activity requiring control (Comerford and Mottram, 2001, 2012). This is what is meant by the use of the term 'matrix.' A failure to control a movement is referred to as an uncontrolled movement (UCM) but first the movement has to be tested.

Within the test procedure the client needs to know that they are being tested on their ability to control a specific movement, be given a chance to learn the test movement, be able to practice the control of the movement for a few repetitions, be corrected as necessary and then perform the test - without feedback.

Undue feedback such as the use of a mirror, or hands-on guidance from the individual being tested themselves or the examiner can increase the clients ability to pass the test which they may not have been able to do without the extra help. The scoring system asks a question, such as, 'Can you prevent side bending of the trunk?' which provides for a yes or no answer.

The Performance Matrix is an online screening tool, it is proprietary and the tester needs to have registered and undergo training, some of which can be provided on-line. As the performance matrix does not deal with pain any health or exercise practitioner from Physiotherapist to Gym instructor can be trained to run the tests.

Once a battery of tests is complete the online tool provides a report identifying the faults found which enables the client to have a program of the most appropriate exercises prescribed that manage the specific faults. A score out of 50 is also provided (a low score indicates a better result) which helps with re-testing after intervention to assess for success.

This example, 'the Double Knee Swing Test' can be found in 'The Foundation Matrix.' The Foundation Matrix is a short testing procedure taking around 25 min to complete once the tester is familiar with the system. Being a short testing procedure there are only 10 tests, 5 tests of low threshold control (postural loading) and 5 tests of high threshold control (strength and speed). Each test is a short movement pattern, or choreography, that asks the tester to watch for 5 control points within that movement pattern. A larger screen such as a sports screen can involve 20 tests

and can add 5 tests of restriction and 5 sport specific tests, it takes longer to complete but gives more information.

The Double Knee Swing Test' is a non fatiguing test, so the load is body weight only. The online tool provides a video of the test that can be shown to the client so they can become familiar with what is required. There is a text description of the test's 'start position' and a description of the 'test movement' and finally the 'benchmark' is identified. This identifies where the test movement should get to. It is imperative that the test movement gets to the benchmark position as any restriction that prevents attainment of the end position needs to be compensated for. The compensation may not be able to be controlled which would then be identified as a failure to pass this aspect of the test - thus defining the failure as an UCM.

The Tester is required to answer the 5 questions about the control points before moving on to the next test. As a general rule the low threshold tests may take a little longer to complete as there is no fatigue element and the client may want to practice the moves, the high threshold tests are very tiring and too many practice attempts may prevent success in passing the tests.

The start position of this test moves from a parallel standing position to a small knee bend. See the description in Fig. 2 and visually in Fig. 3(a) and 3(b).

The test movement involves the knees swinging in tandem from side to side, rotating the femur in the acetabulum. The movement should be occurring at the hip and knee joints without compensation elsewhere in the kinetic chain. The benchmark dictates that the knees have to reach 20° to each side Fig. 4(a) and 4(b).

The movement analysis

Once the test has been adequately taught, but not overly practiced, a series of questions are asked on the online form looking for specific sites and directions of uncontrolled movement. For example, in this test, one of the sites used in the testing is at the hip. A movement control issue might be highlighted where the hip extensors do not recruit adequately during the test and the client might move the trunk forward, increasing flexion at the hip. This might not be an uncontrolled movement unless the client has had this movement pattern pointed out to them and been given the chance to correct this potential fault. If the client does then correct the movement fault it is not

The Performance Matrix

Site:	The anatomical area that is affected by an uncontrolled movement
Direction:	The direction an uncontrolled movement may moves into e.g. flexion, extension, rotation, translation
Threshold:	Low threshold vs. High threshold. Low threshold loads are loads easily controlled by low effort muscular recruitment, primarily utilising the slow motor unit. Fundamentally these are postural loads. High threshold loading requires speed or strength to control them and are primarily targeting the fast motor unit.

Fig. 1 The Performance Matrix is used to identify 3 major factors of uncontrolled movement.

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