Strength & Conditioning Team

The Role of Functional Movement Screening at the GSoS

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Background

- Common thinking that isolated muscle stretching and/or strengthening would be an effective intervention to reduce musculoskeletal injury
- Research has suggested that this alone will not be effective
- Isolated rehab after injury is not sufficient to normalise performance which involves the whole body (Nadier et al., 2002)

Data also suggests isolated injury adversely affects other body regions (Hewett et al., 2006)
- Concept of regional interdependence exists where dysfunction in one body region contributes to weakness, tightness and pain in another (Wainner et al., 2007)
- Suggests a tool that can measure injury risk and regions of movement dysfunction and muscle imbalance would be beneficial in reducing the overall potential for injury

Functional Movement Screening (FMS)

- A way to assess multiple domains of function simultaneously is attractive in a number of ways:
  - Injury prevention
  - Determining muscle imbalances
  - Identifying movement dysfunction
  - Targeting interventions to address dysfunctions/imbalances to improve movement
  - Tracking adaptations to training/interventions
- FMS is one method of doing this

The Performance Pyramid

- The optimal performance pyramid assumes that by improving functional movement, functional performance and ultimately functional skill will be improved
- It could then be purported that if functional skill can be improved, the array of motor skills will be improved and thus the opportunity to improve sport specific skill would be increased
Over-powered Performance Pyramid

- This is characterised by an emphasis on too much functional performance (physiological measures)
- There is too little emphasis on functional movement which will ultimately limit functional skill development and thus sport specific skill development and performance
- Athletes will be very fit but are likely to lack functional skill and have an increased rate of injury

Under-powered Performance Pyramid

- This is characterised by too much emphasis on functional movement
- There will be a limited development of functional performance (physiological measures)
- The athlete will likely be very skilful but lack the physiological development required to be an elite athlete and cope with the demands of day-to-day training

Balancing Functional Movement

- The long term player development strategy at the GSoS lends itself well to incorporating functional movement through the generic movement programme
- Need to consider how functional movement screening fits within the strategy and how dysfunctions are addressed through training interventions

Support for the FMS

- Kiesel et al. (2007) examined relationship between FMS scores and pre-season injury in 46 professional American footballers
- Serious injury = unable to play or train for at least 3 weeks
- Score of 14 or less = predicted serious injury
- Those who scored a low FMS score were injured more often
- Suggests that FM is identifiable risk factor for injury
Support for the FMS
- Kiesel et al. (2009) reported on the effects of an off-season FM intervention in 62 American Footballers
- After FMS athletes were prescribed corrective exercises to enhance relationship between core muscle activation and fundamental movement
- Intervention was 6 days per week for 7 weeks
- Significant improvement in FMS pre-to-post intervention
- 7 players pre intervention with a score >14
- 39 players post intervention with a score >14
- 31 players free of asymmetry pre-intervention
- 42 players free of asymmetry post-intervention

Normative FMS values
- Schneiders et al. (2011) established normative values for active males and females aged 18-40
- Average score of 15.7 with no gender differences in composite score
- Females scored higher in active straight leg raise
- Males scored higher on trunk stability and push up

FMS and S&C Interventions
- Screen all new S1 pupils
- Introduce new technical/functional lifting programme for S1 pupils aimed to improve mobility
- Screen pupils after 8 weeks and compare FMS scores
- Detailed intervention incorporated into all existing pupils S&C programmes based on common themes across year groups and sport

Corrective Exercise Sequencing
- Linear path from basic mobility to basic stability
  1. Mobility exercises – focus on joint range of motion, tissue length and muscle flexibility
  2. Stability exercises – focus on basic sequencing of movement
  3. Movement pattern retraining – incorporates the use of fundamental mobility and stability into specific movement patterns to reinforce coordination and timing

Support for the FMS
- Butler et al. (2010) investigated biomechanics of the deep squat exercise from the FMS
- Conclusions:
  - Individuals who score differently demonstrate different mechanics of movement
  - This suggest deep squat is a good tool to measure joint mobility
  - Different corrective interventions are needed depending on score and thus the nature of the movement dysfunctions and muscle imbalances

FMS and the GSoS
- All new S1’s undertake a FMS in August (start of term) of the year they start GSoS
- All existing S1-S6 screened 3-4 times per year to fit with training/competition plan
- All pupils to be screened in sport specific groups
- Data used to establish current functional movement ability and establish normative data
Implications of Administering FMS

- Purchase FMS testing kit and manual (~£250)
- Time out of sport specific time to administer FMS
- Increased workload of (S&C) coaching team
  - Time to administer FMS
  - Time to analyse FMS results (2-3 days)
  - Time to write corrective programmes (depends on nature of dysfunctions)
  - Time to administer training
    - Within normal S&C/a sport specific training or additional stand alone sessions?
    - Input from other support staff to write combined intervention programmes e.g. physio

Potential research topics

- Normative functional movement screen data in elite youth sport athletes.
- Do differences exist in functional movement screen values in elite sports school pupils vs. pupils involved in school-based physical education?
- Do S&C training interventions improve performance in the functional movement screen in elite youth athletes?
- Are functional movement screen scores related to performances variables in elite youth sport athletes?
- The functional movement screen assessment: do poor testing scores predict the incidence of injury in elite youth athletes?

How could FMS be used in your sport?

- Think about the type of sport you coach
  - Emphasis on skill vs. physical components
- Level of athlete
- Advantages vs. disadvantages
- What happens if we don’t screen?
- Efficient use of budgets
  - Screening and prevention vs. reactive physio support

How could FMS be used in your sport?

The GSoS S&C programme

- S1-2
  - Generic movement training programme
    - Emphasis on developing motor skills required to be successful in any sport
    - Developing fitness components required to be an “athlete”
- S3-4
  - Introduction of a strength and conditioning programme that is periodised to fit the sport specific competition structure
  - Introduction to the range of recovery strategies available to athletes

The GSoS S&C programme

- S5-6
  - Introduction of a sport specific strength and conditioning programme that takes into account the nature of the sport and event/position
  - Use of recovery strategies at appropriate phases in competitive plan
  - Player led focus developing weaknesses and utilising strengths

Olympic Lifting and Functional Movement Training Interventions

- Olympic lifting exercises
  - Snatch
  - Clean & Jerk
  - Variations/derivatives of each
- Why?
  - Olympic lifts and squatting are fundamental to overall strength development, mobility and stability
  - Hip, ankle, knee, back and shoulder stability/mobility
  - Mobility and stability of all major joints to enable better stabilisation and more efficient energy utilisation and transfer
Joint — Primary Need
- Ankle — mobility
- Knee — stability
- Hip — mobility
- Lumbar Spine — stability
- Thoracic Spine — mobility
- Scapula — stability
- Gleno-humeral — mobility

Correcting Movement Flaws
- Valgus knees
  - Knees track in relative to hip and ankle
  - Knee should track out over foot
  - Can be corrected by squatting with a band around the knees

Mobility vs. flexibility
- Mobility
  - The ability to move or to be moved; capacity for movement or change of place; movableness, portability
- Flexibility
  - Capability of being bent; pliancy

The Functional Movement Screen
- Devised by Cook (2003) as a means of categorising functional movement patterns
- Uses 7 movements that categorise the foundation for human movement
  - Deep squat
  - Step
  - Lunge
  - Reach
  - Leg raise
  - Push-up
  - Rotational stability

The Functional Movement Screen
- The S&C coach follows strict criteria to administer the tests
- The athlete completes each test 3 times
- The screen can be videoed and reviewed after (use 2 different camera angles)
- Suggested that 3 S&C coaches rate the athlete on each test and collectively agree the score
- Each test is scored out of 3
- Where there is a bilateral dysfunction the lowest score is given

Scoring the FMS
- 3 = Perfect execution of the movement pattern
  - No compensatory movement can be made at all
- 2 = Execution that demonstrates compensation and less than perfect form
- 1 = Inability to complete the movement pattern because of stiffness, loss of balance or another difficulty
- 0 = Pain during the movement (regardless of how well the athlete performed the movement)
The FMS Exercises
1. Deep squat
2. Hurdle step
3. In-line lunge
4. Shoulder mobility
5. Push up
6. Straight leg raise
7. Rotational stability

Deep Squat

Deep Squat Scoring Criteria
1. To score a 3
   - Upper torso is parallel with tibia or toward vertical
   - Femur below horizontal
   - Knees aligned over feet
   - Dowel aligned over feet (within base of support)
2. To score a 2
   - As above with but with heels raised
3. To score a 1
   - Tibia and upper torso are not parallel
   - Femur is not below horizontal
   - Knees are not aligned over feet (valgus knee)
   - Lumbar flexion is noted
   - Dowel not aligned over feet (out with base of support)
4. If there is pain executing the movement the score is 0

Hurdle Step

Hurdle Step Scoring Criteria
1. To score a 3
   - Hips, knees and ankles remain aligned in the sagittal plane
   - Minimal to no movement is noted in the lumbar spine
   - Dowel and hurdle remain parallel
2. To score a 2
   - Alignment is lost between hips, knees and ankles
   - Movement is noted in lumbar spine
   - Dowel and hurdle do not remain parallel
3. To score a 1
   - Contact between foot and hurdle occurs
   - Loss of balance is noted
4. If there is pain executing the movement the score is 0

In-line Lunge
**In-line Lunge Scoring Criteria**

1. To score a 3
   - Dowel contacts maintained
   - Dowel remains vertical
   - No torso movement noted
   - Dowel and foot remain in sagittal plane
   - Knee touches board behind heel of front foot

2. To score a 2
   - Dowel contacts not maintained
   - Dowel does not remain vertical
   - Movement noted in torso
   - Dowel and foot do not remain in sagittal plane
   - Knee does not touch heel of front foot

3. To score a 1
   - Loss of balance noted

4. If there is pain executing the movement the score is 0

**Shoulder Mobility Clearing Test**

- Perform this clearing test bilaterally
- If there is pain associated with this movement, give a zero and perform a thorough evaluation of the shoulder by referring to physio

**Shoulder Mobility**

**Shoulder Mobility Scoring Criteria**

1. To score a 3
   - Fists are within one hand length

2. To score a 2
   - Fists are within one-and-a-half hand lengths

3. To score a 1
   - Fists are not within one-and-a-half hand lengths

4. If there is pain executing the movement the score is 0

**Spinal Extension Clearing Test**

- Perform a press-up in the push up position with hip remaining in contact with the floor
- If there is pain associated with this motion, give a 0 score and refer to physio for a more detailed evaluation

**Push Up**
Push Up Scoring Criteria

1. To score a 3
   - The body lifts as a unit with no lag in the spine
   - Men – thumbs aligned to top of head
   - Women – thumbs aligned with chin
2. To score a 2
   - The body lifts as a unit with no lag in the spine
   - Men – thumbs aligned with chin
   - Women – thumbs aligned with clavicle
3. To score a 1
   - Men are unable to perform a repetition with thumbs aligned with the chin
   - Women are unable to perform a repetition with thumbs aligned with the clavicle
4. If there is pain executing the movement the score is 0

Active Straight Leg Raise Scoring Criteria

1. To score a 3
   - Vertical line of the malleolus between mid-thigh and ASIS (anterior superior iliac spine)
   - The non-moving limb remains in neutral position
2. To score a 2
   - Vertical line of the malleolus between mid-thigh and joint line
   - The non-moving limb remains in neutral position
3. To score a 1
   - Vertical line of the malleolus resides below joint line
   - The non-moving limb remains in neutral position
4. If there is pain executing the movement the score is 0

Spinal Flexion Clearing Test

- Assume a quadruped position
- Rock back and touch buttocks to the heels and the chest to the thighs
- The hands should remain in front of the body, reaching out as far as possible
- If there is pain associated with this position give a zero and refer to physio

Rotational Stability Scoring Criteria

1. To score a 3
   - Performs a correct unilateral repetition
2. To score a 2
   - Performs a correct diagonal repetition
3. To score a 1
   - Inability to perform a diagonal repetition
4. If there is pain executing the movement the score is 0