Assessment of Functional Movement Screening™ by Assessors of Three Different Skill Levels

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BACKGROUND AND PURPOSE

- The Functional Movement Screen™ (FMS) is a series of 7 physical tests.
- FMS screens fundamental movement patterns that require mobility, stability, and motor control.
- FMS is comprised of deep squat (DS), hurdle step (HS), in-line lunge (IL), shoulder mobility (SHM), active straight leg raise (ASLR), trunk stability push-up (TSP), and rotary stability (RS).
- Sports medicine clinicians use FMS to assess for dysfunctional movement patterns.
- FMS is not intended to be a diagnostic tool.
- The inter-rater reliability for FMS has values ranging from 0.37 to 0.91.
- The intra-rater reliability for FMS has values ranging from 0.76 to 0.98.
- FMS was designed as a means of filling the void between pre-participation screenings and performance tests.
- A lack of uniform definitions for varying skill levels of FMS raters creates difficulty in the interpretation of the studies.

METHODS

- Participants arrived at biomechanical laboratory & were briefed on the testing procedures.
- Reflective markers were attached on the subjects’ major joints & key anatomical landmarks.
- A research team member read the FMS script instructing subjects on how to do each movement.
- Anterior & both lateral views were video taped using GoPro Cameras.
- Exercises were performed in the order as recommended by the FMS protocol.
- Videos were assessed by 2 expert raters, 2 intermediate raters and 2 novice raters.
- Raters scored all 20 participants using the FMS scoring sheet on a 0-3 scale.
- 1 = movement performed correctly
- 2 = completes mvt with compensation
- 3 = not able to perform the movement

RESULTS

- Our results show that raters with experience assessing the FMS seem to score more consistently throughout.
- Inter-rater reliability across all exercises was best for the intermediate pairing (Table 3).
- Mean inter-rater reliability across all exercises was highest for the intermediate pairing (Table 3).
- Best mean of mixed pairings of raters were Int1-Exp1 (0.70); Int2-Exp1 (0.64); Int2-Exp2 (0.57).

PARTICIPANT CHARACTERISTICS

- 20 healthy, physically active, college students: 13 males and 7 females (Table 1).
- Subjects who had suffered a musculoskeletal injury within the last 6 months were excluded.
- Six raters were used to assess subjects performing the various FMS exercises.
- Operationally defined rater skill level were as follows:
  - Expert raters had at least 5 years of experience of FMS assessment.
  - Intermediate raters had ≥ 2 years, but < 5 years of experience in FMS assessment.
  - Novice raters untrained in FMS assessment & had observed FMS less than 10 times.

Table 1. Descriptive statistics of subjects

<table>
<thead>
<tr>
<th>Metric</th>
<th>All Subjects</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>21.0 (±2.05)</td>
<td>20.71 (±1.98)</td>
<td>21.15 (±2.15)</td>
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<tr>
<td>Height (cm)</td>
<td>172.15 (±7.74)</td>
<td>165.28 (±6.97)</td>
<td>175.85 (±5.30)</td>
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<tr>
<td>Weight (kg)</td>
<td>76.36 (±12.05)</td>
<td>68.67 (±11.56)</td>
<td>81.43 (±10.07)</td>
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<tr>
<td>BMI</td>
<td>25.98 (±3.83)</td>
<td>25.22 (±4.05)</td>
<td>26.38 (±3.55)</td>
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</table>

Table 2. Pooled ICCs

<table>
<thead>
<tr>
<th>Combination</th>
<th>Pooled ICC</th>
<th>1st vs. 2nd trial</th>
<th>High ICC</th>
<th>Low ICC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov1 - Nov2</td>
<td>0.773 TSP = 0.923</td>
<td>0.503 HS = 0.503</td>
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<td></td>
</tr>
<tr>
<td>Nov2 - Nov1</td>
<td>0.602 TSP = 0.905</td>
<td>0.603 DS = 0.603</td>
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</tr>
<tr>
<td>Int1 (0.57)</td>
<td>0.805 DS = 1.000</td>
<td>0.878 IL = 0.878</td>
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<tr>
<td>Int2 (0.57)</td>
<td>0.604 DS = 1.000</td>
<td>0.530 IL = 0.530</td>
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<tr>
<td>Exp1 (0.57)</td>
<td>0.818 HS &amp; ASLR = 1.000</td>
<td>0.632 RS = 0.632</td>
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</table>

Table 3. Cohen’s Kappa

<table>
<thead>
<tr>
<th>Combination</th>
<th>DS</th>
<th>HS</th>
<th>IL</th>
<th>SHM</th>
<th>ASLR</th>
<th>TSP</th>
<th>RS</th>
<th>Mean</th>
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</thead>
<tbody>
<tr>
<td>Nov1 - Nov2</td>
<td>0.123 0.583 0.375 0.103 0.583 0.342 0.294 0.343 0.343</td>
<td>0.290</td>
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<tr>
<td>Nov2 - Nov1</td>
<td>0.125 0.494 0.366 0.191 0.054 0.494 0.046 0.036 0.036</td>
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<tr>
<td>Int1-Int2</td>
<td>1.000 0.242 0.604 0.542 0.771 0.242 0.510 0.659 0.659</td>
<td>0.523</td>
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<tr>
<td>Int2-Int1</td>
<td>1.000 0.242 0.604 0.542 0.771 0.242 0.510 0.659 0.659</td>
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<tr>
<td>Exp1-Exp2</td>
<td>0.706 0.030 0.425 0.844 0.464 0.020 0.412 0.413 0.413</td>
<td>0.380</td>
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<tr>
<td>Exp2-Exp1</td>
<td>0.630 0.033 0.416 0.780 0.409 0.033 0.313 0.313 0.313</td>
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REFERENCES