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5-2017

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Repository Citation

Cole, M., McCollister, M., Greier, N., Fagan, S., Froehle, A., Curry, N., Bradford, J., Muse, B., & Bruce, S. (2017). Assessment of Functional Movement Screening™ by Assessors of Three Different Skill Levels. . https://corescholar.libraries.wright.edu/kinesiology_health/70

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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 tests¹
- FMS screens fundamental movement patterns that require mobility, stability, and motor control²
- 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)¹ (Figures 1-4)
- Sports medicine clinicians use FMS to assess for dysfunctional movement patterns²
 - FMS is not intended to be a diagnostic tool²
- The inter-rater reliability for FMS has values ranging from 0.37 to .95^{3,6,7,8}
- The intra-rater reliability for FMS has values ranging from 0.76 to 0.98^{4,6,7,8}
- FMS was designed as a means of filling the void between pre-participation screenings and performance tests⁵
- A lack of uniform definitions for varying skill levels of FMS raters creates difficulty in the interpretation of the studies
- The purpose of this study was to examine the intra- and inter-rater reliability on the FMS by novice, intermediate, & expert level raters

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 skills 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 6 times

Table 1. Descriptive statistics of subjects

	All Subjects	Females	Males
Age (years)	21.0 (± 2.05)	20.71 (±1.98)	21.15 (±2.15)
Height (cm)	172.15 (± 7.74)	165.28 (± 6.97)	175.85 (± 5.30)
Weight (kg)	76.96 (± 12.05)	68.67 (± 11.56)	81.43 (± 10.07)
BMI	25.98 (± 3.83)	25.22 (± 4.55)	26.38 (± 3.51)

Figure 1. Trunk stability push-up



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 mvt
- Anterior & both lateral views were video taped using GoPro Cameras, (San Mateo CA)
- 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
 - 3 = performs movement correctly¹
 - 2 = completes mvt with compensation¹
 - 1 = not able to preform the mvt¹
 - 0 = pain¹
- One week later video assessment of all 20 subjects was performed again by the same raters
- Statistical analysis included ICC and Cohen's Kappa

Figure 2. Deep squat:
A, anterior view; B, lateral view

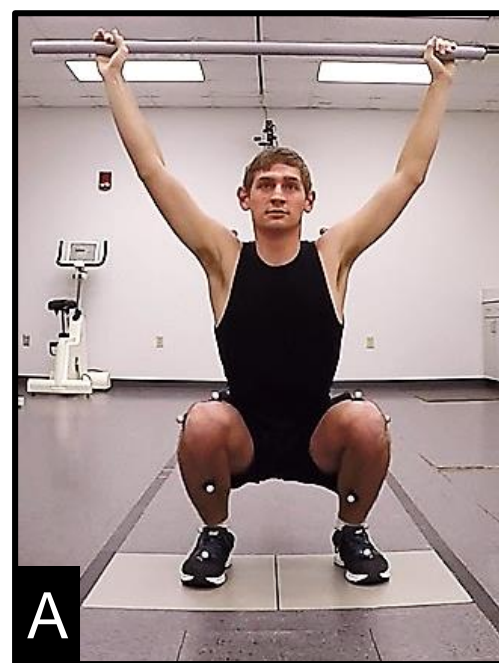
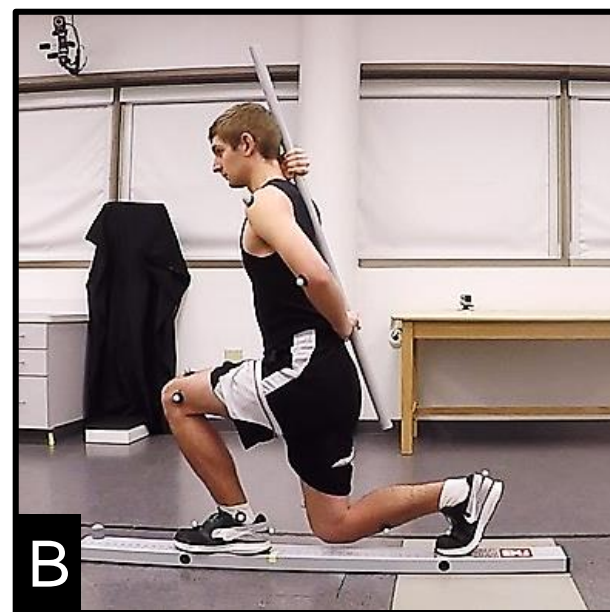
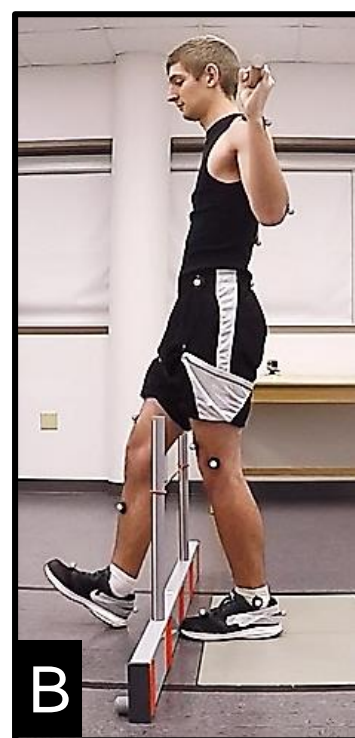
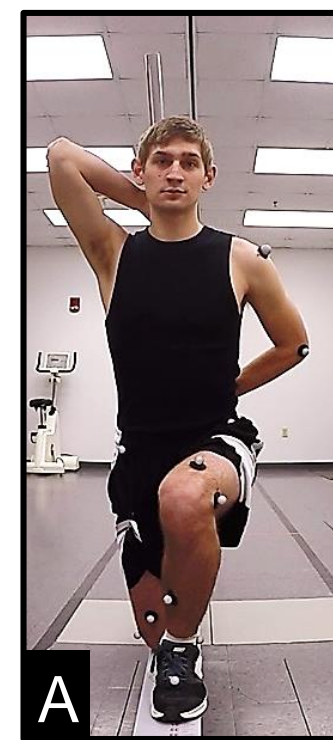


Figure 3. Hurdle step:
A, anterior view; B, lateral view



Figure 4. In-line lunge:
A, anterior view; B, lateral view



RESULTS

- “Intermediate” raters had slightly better ICC mean than the “expert” raters (Table 2)
- Mean inter-rater reliability across all exercises was best for the intermediate pairing (Table 3)
- Best mean of mixed pairings of raters were Int1-Exp1 (0.70); Int1-Exp2 (0.64); Int2-Exp2 (0.57)

Table 2. Pooled ICCs

Rater	Pooled ICC: 1st trial vs. 2nd trial	High ICC	Low ICC
Nov1	0.773	TSP = 0.923	HS = 0.503
Nov2	0.602	TSP = 0.905	DS = -0.053
Int1	0.983	6 mvts = 1.000 ea	TPS = 0.878
Int2	0.805	DS = 1.000	IL = 0.516
Exp1	0.959	6 mvts = 1.000 ea	ShM = 0.713
Exp2	0.818	HS & ASLR = 1.000	RS = 0.622

Table 3. Cohen's Kappa

	DS	HS	IL	ShM	ASLR	TSP	RS	Mean	Combo Mean
Nov1 - Nov2	0.123	0.583	0.375	0.294	0.103	0.583	0.342	0.343	0.290
Nov1 - Nov2	0.076	0.494	0.268	0.219	0.054	0.494	0.048	0.236	
Int1-Int2	1.000	0.242	0.604	0.542	0.771	0.242	0.510	0.559	0.523
Int1-Int2	1.000	0.174	0.406	0.538	0.768	0.174	0.355	0.488	
Exp1-Exp2	0.706	0.020	0.425	0.844	0.464	0.020	0.412	0.413	0.380
Exp1-Exp2	0.630	-0.033	0.416	0.700	0.439	-0.033	0.313	0.347	

EVIDENCE-BASED RECOMMENDATIONS / CLINICAL RELEVANCE

- Our results show that raters with experience assessing the FMS seem to score more consistently throughout
- Novice raters appear to be able to successfully assess the FMS, but lack of experience leads to inconsistent scores
- Lack of consistency for both intra- & inter-rater reliability across the 7 movements regardless of raters' skill is concern

REFERENCES

- Beardsley C, Contreras B. The Functional Movement Screen: A review. *Strength Cond J* October 2014; 36(5):72-80.
- Cook G, Burton L, Hoogenboom B, Voight M. Functional Movement Screening: The use of fundamental movements as an assessment of function part-2. *Int J Sports Phys Ther*. August 2014; 9(4):549-563
- Gulgin H, Hoogenboom B. The Functional Movement Screening™ (FMS): An inter-rater reliability study between raters of varied experience. *Int J Sports Phys Ther*. 2014; 9(1):14-20.
- Gribble P, Brigle J, Pietrosimone B, Pfile K, Webster K. Intrarater reliability of the Functional Movement Screening. *J Strength Cond Res* April 2013; 27(4):978-981
- Minick KI, Kiesel KB, Burton L, Taylor A, Plisky P, Butler RJ. Interrater reliability of the Functional Movement Screen. *J Strength & Cond Res* 2010; 24(2):479-486.
- Onate JA, Dewey T, Kollock RO, et al. Real-time intersession and interrater reliability of the Functional Movement Screen. *J of Strength & Cond Res*. 2012; 26(2):408-415.
- Shultz R, Anderson SC, Matheson GO, Marcello B, Besier T. Test-retest and interrater reliability of the functional movement screen. *J Athlet Training*. 2013; 48(3):331-336.
- Smith CA, Chimera NJ, Wright NJ, Warren M. Interrater and intrarater reliability of the functional movement screen. *J Strength & Cond Res*. 2013; 27(4):982-987.
- Stobierski LM, Fayson SD, Minthorn LM, Valovich McLeod TC, Welch CE. Reliability of clinician scoring of the Functional Movement Screen to assess movement patterns. *J Sport Rehab*. 2015; 24(2):219-222.