



The Selective Functional Movement Assessment

Gray Cook, MSPT, OCS, CSCS
author, *Movement*

Thank you!

AAOM members,

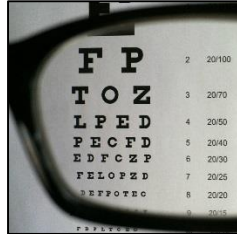
Thank you for the opportunity to discuss movement assessment.



Dr. Kyle Kiesel and Dr. Todd Arnold

Where are we?

Annual Health Care Dollars Spent



Eye care = \$31.4 Billion

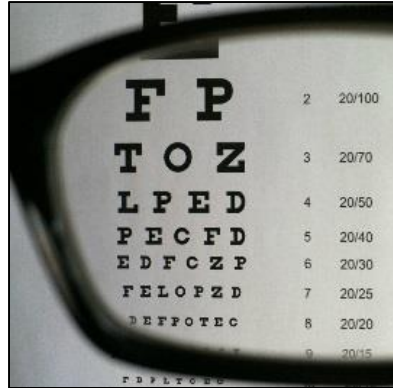


Dental care = \$269 Billion



Cardiac care = \$444 Billion

Total = \$744.4 Billion (CDC data)

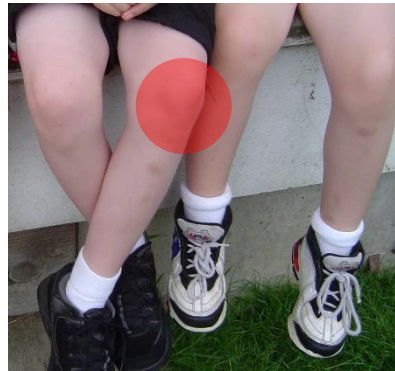


Eye, Dental and Heart care all have screens . . .

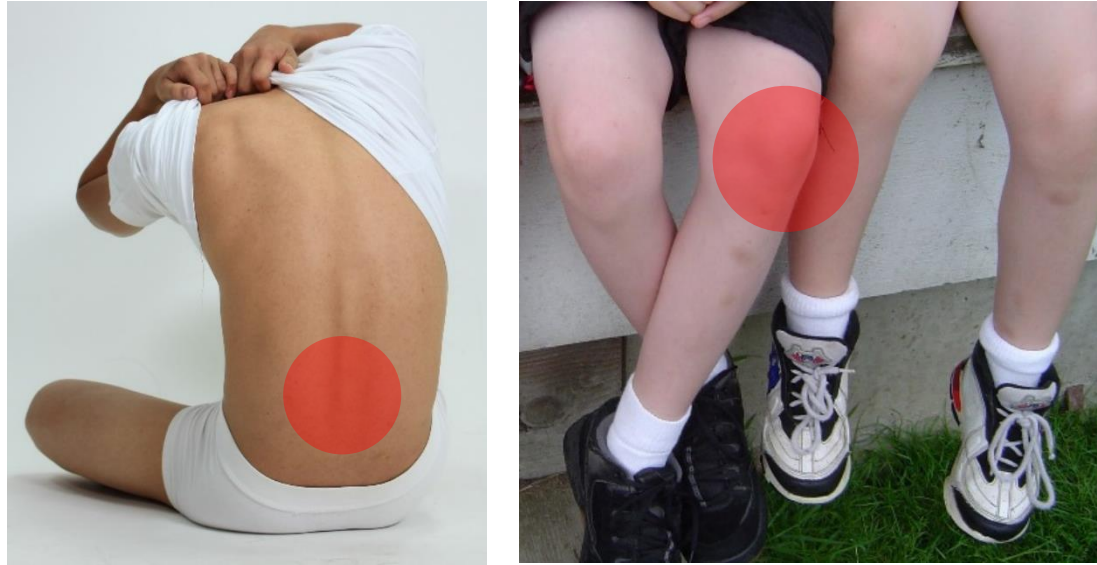
For **signs**, before symptoms are present.

Where are we?

Annual Health Care Dollars Spent



Musculoskeletal care = **\$849 Billion**



In Musculoskeletal care . . .
we wait for **symptoms** and then arbitrarily value the
signs that we think contribute to the problem.

. . . We wait for **symptoms** and then arbitrarily value the signs that we think contribute to the problem.

- *Weak core?*
- *Tight muscles?*
- *Sedentary?*
- *Addicted to exercise?*
- _____?



Selective Functional Movement Assessment

Development began with a simple, but misguided request from Dr. Greg Rose - *Titleist Performance Institute*



“We need a standard orthopedic assessment for golfers.”

But then . . .

“We need a standard orthopedic assessment for runners.”

“We need a standard orthopedic assessment for _____.”

No.

We *need* a standard orthopedic assessment for humans.

Selective Functional Movement Assessment

We need a **systematic** way to identify the vital impairments of **mobility** and **motor control** associated with **functional movement patterns** complicated by pain.

Selective Functional Movement Assessment



1. Cervical Spine



2. Upper Extremity



3. Multi-Segmental Flexion



4. Multi-Segmental Extension



5. Multi-Segmental Rotation



6. Single-Leg Stance



7. Overhead Deep Squat



Scoring of the SFMA



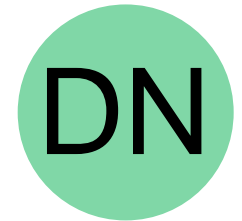
- Functional and Non-Painful



- Functional and Painful



- Dysfunctional and Painful



- Dysfunctional and Non-Painful

Scoring of the SFMA



- Can without Pain



- Can with Pain

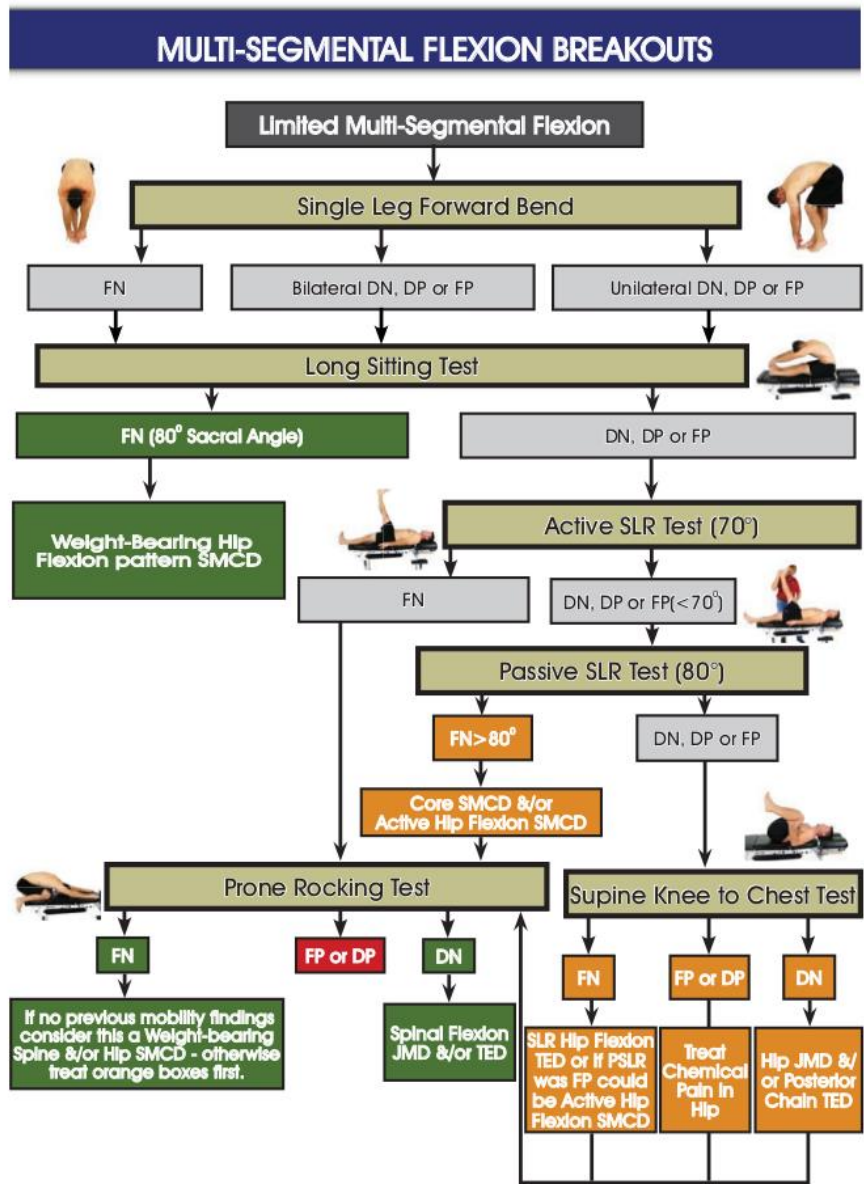


- Can't with Pain



- Can't without Pain





A really good question...

*Where did we develop our opinions about
movement function and dysfunction?*

Movement Patterns

We started this journey by simply categorizing human movement patterns **not by measuring body parts**



Movement Patterns

We started this journey by simply categorizing human movement patterns **not by measuring body parts**



What does the research say about movement screening?

- Reliable tool that can be quickly and easily administered in any setting
- Can be used as a tool to identify who is at risk for injury within certain population groups
- The screen score can be improved with simple, individualized exercises

FMS (Reliability)

Study	Journal	Results
Onate et al, 2012	<i>J Strength Cond Res</i>	The FMS total scores displayed high intersession and interrater reliabilities
Bribble et al,	<i>J Strength Cond Res</i>	Intrarater reliability is strong and seems to strengthen when the individuals are exposed to the FMS in a clinical experience.
Teyhen et al, 2012	<i>Journal of Orthopaedic & Sports Physical Therapy</i>	FMS composite score demonstrated moderate to good interrater and intrarater reliability
Smith et al, 2013	<i>J Strength Cond Res</i>	HS least Reliable test SM most reliable test
Gulan et al, 2014	<i>Int J Sports Ther</i>	Level of experience of the rater scoring the FMS™ should be considered, as it appears that the expert rater was more critical than novice raters in the interpretation of the scoring criteria

Onate, J., Dewey, T., Kollock, R., Thomas, K., Van Lunan, B., Demaio, M., & Ringleb, S. (2012). *J Strength Cond Res. Real-time Intersession and Interrater Reliability of the Functional Movement Screen.*, 26(2), 408-15

Gribble, P., Brigle, J., Pietrosimone, B., Pfile, K., & Webster, K. (n.d.). Intrarater Reliability of the Functional Movement Screen. *Journal of Strength and Conditioning Research*, 978-981

Teyhen, D., Shaffer, S., Lorenson, C., Halfpap, J., Donofry, D., Walker, M., Childs, J. (n.d.). The Functional Movement Screen: A Reliability Study. *Journal of Orthopaedic & Sports Physical Therapy*, 530-540

Smith, C., Chimera, N., Wright, N., & Warren, M. (n.d.). Interrater and Intrarater Reliability of the Functional Movement Screen. *Journal of Strength and Conditioning Research*, 982-987

Gulan, H., & Hoogenboom, B. (2014). The functional movement screening (fms)™: An inter-rater reliability study between raters of varied experience. *Int J Sports Phys Ther*, 9(1), 14-20

FMS (Injury Validity)

Study	Journal	Population	n	Results
Teyhen et al, 2015	<i>Clin Orthop Rel Res</i>	US Army Rangers	211	Asymmetrical ankle dorsiflexion & Pain with Functional Movement Screen clearing tests were associated with increased injury risk
Zalai et al,	<i>Hungarian Academy of Sciences</i>	Pro Football Players	20	Ankle injuries can effect FMS Hurdle Step performance and Knee and hip injuries can effect FMS Deep Squat performance
Garrison et al, 2014	<i>Int J Sports Phys The</i>	College Athletes	160	Athletes with an FMS™ composite score at 14 or below combined with a self-reported past history of injury were at 15 times increased risk of injury.
Mccal et al, 2014	<i>Br J Sports Med</i>	Pro Soccer Teams	44	The FMS was ranked the number 1 tool to identify injury risk in Professional International Premier leagues teams
Kiesal et al, 2014	<i>JSR Journal of Sport Rehabilitation</i>	Pro Football Players	238	Combination of scoring below the 14 and exhibiting a movement asymmetry was leading cause of injury
O'Connor et al, 2011	<i>Medicine & Science in Sports & Exercise</i>	USMC Officer Candidates	874	FMS composite of 14 or below were twice as likely to drop out of basic training due to injury. 14 or below twice as likely to drop out, whether injured or not.

Teyhen, D., Shaffer, S., Butler, R., Goffar, S., Kiesal, K., Rhon, D., Plisky, P. (2015). What Risk Factors Are Associated With Musculoskeletal Injury in US Army Rangers? A Prospective Prognostic Study. *Clinical Orthopaedics and Related Research*® Clin Orthop Relat Res

Zalai, D., Panics, G., Bobak, P., Csáki, I., & Hamar, P. (n.d.). Quality of functional movement patterns and injury examination in elite-level male professional football players. *Acta Physiologica Hungarica*, 34-42

Garrison, M., Westrick, R., Johnson, M., & Benenson, J. (2015). Association between the functional movement screen and injury development in college athletes. *Int J Sports Phys Ther*, 21-8.

Mccall, A., Carling, C., Nedelec, M., Davison, M., Gall, F., Berthoin, S., & Dupont, G. (2014). Risk factors, testing and preventative strategies for non-contact injuries in professional football: Current perceptions and practices of 44 teams from various premier leagues. *British Journal of Sports Medicine*, 1352-1357.

Kiesal, K., Butler, R., & Plisky, P. (2014). Prediction of Injury by Limited and Asymmetrical Fundamental Movement Patterns in American Football Players. *JSR Journal of Sport Rehabilitation*, 88-94

O'Connor, F., Deuster, P., Davis, J., Pappas, C., Knapik, J. (2011) Functional Movement Screening: Predicting Injuries in Officer Candidates. *Medicine & Science in Sports & Exercise*, 2224-2230

FMS (Modifiability)

Study	Journal	Population	n	Program Time	Control Group	FMS Composite Change
Goss et al., 2009	<i>J Spec Oper Med</i>	Special Ops Soldiers	90	6 weeks	N	2.5
Cowen et al., 2010	<i>J Bodyw Mov Ther</i>	Firefighters	77	6 weeks	N	3.3
Kiesel et al., 2011	<i>Scand J Med Sci Sports</i>	Pro Football players	62	6 weeks	N	3.0
Frost et al., 2011	<i>J Strength Cond Res</i>	Firefighters	60	12 weeks	Y	NC

Movement training does **not** change FMS score
Not all training programs improve FMS results

Using basic information from the FMS screen and programming an exercise intervention from that data can lead to improvement

An Individualized Training Program May Improve Functional Movement Patterns Among Adults.

8-10 minute movement screen



Screening creates *perspective*



Movement Competency
Movement Function

Lack of Movement Competency
Movement Dysfunction

Drawing the line creates the action point.

“What gets measured gets done”



Simple to complex motor control requirements within the FMS help you find that developmental level.

FMS Scoring

- 3 Perform pattern as directed
- 2 Perform pattern with compensation/imperfection
- 1 Unable to perform pattern
- 0 Pain with pattern regardless of quality



What is the “Real” Objective?

VITAL SIGN

- 3 Perform pattern as directed
- 2 Perform pattern with compensation/imperfection

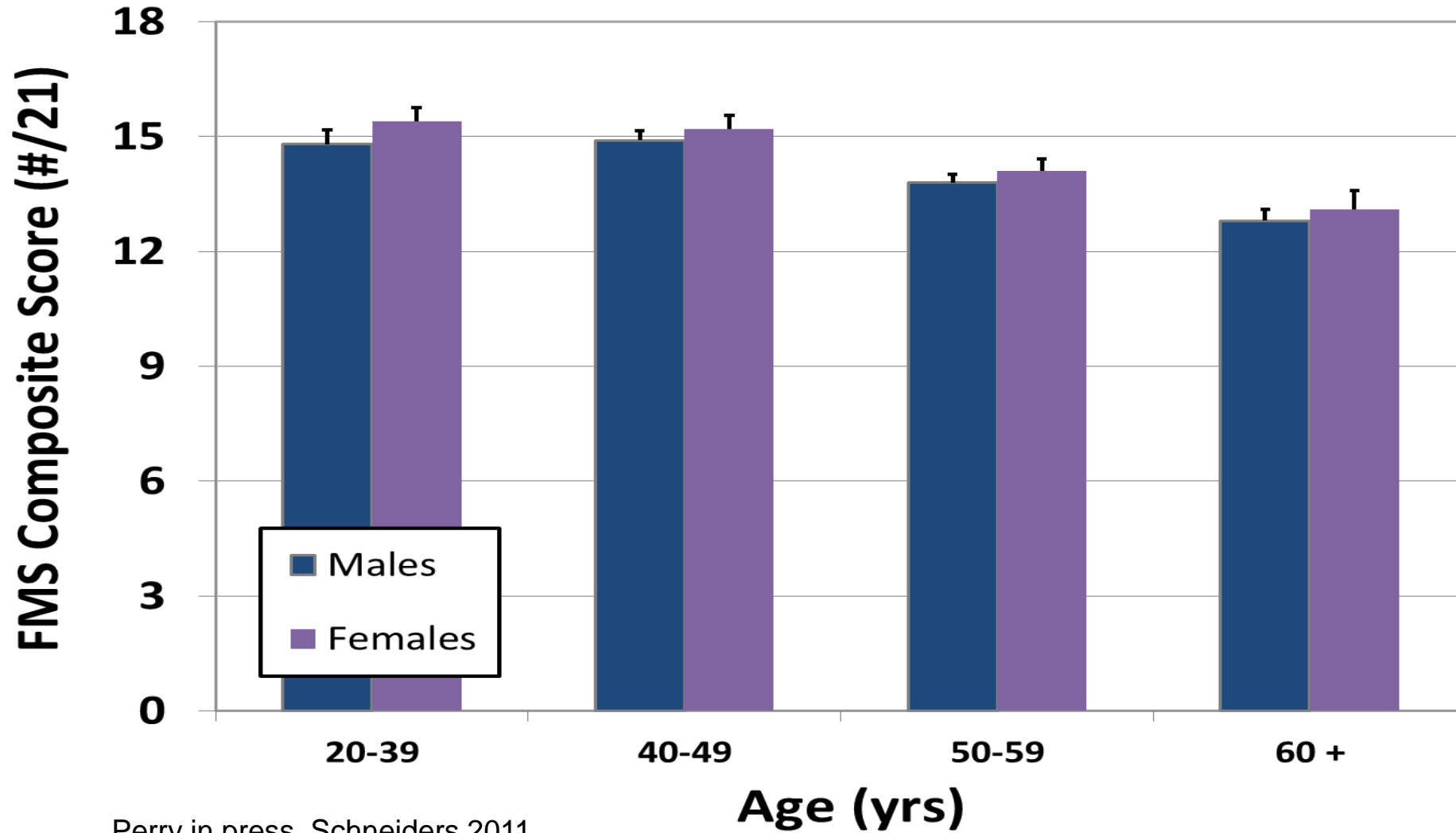


DYSFUNCTION

- 1 Unable to perform pattern
- 0 Pain with pattern regardless of quality



FMS: across age groups



Perry in press, Schneiders 2011

A simple battery of **seven movements** over the course of less than **10 minutes** demonstrates pain in over **20% of people** preparing to go into an athletic or strenuous endeavor, and who have been declared healthy themselves and/or by a physician.



Adaptability/Prediction Injury Risk/Prediction

If the goal is prediction you must consider characteristics that are *meaningful* and *modifiable*:

~~1. Previous injury~~

~~2. Severity of previous injury~~

3. Pain with any movement test

4. Ankle mobility (ROM symmetry)

5. Performance on movement screening and balance testing

Once an injury occurs . . . the more 2s and 3s individual has, the faster they return to activity.

33% fewer missed training days



3 Perform pattern as directed

2 Perform pattern with compensation/imperfection

1 Unable to perform pattern

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Costs for Sprain/Strain Injuries

Academy 33-36 (4 recruit classes)

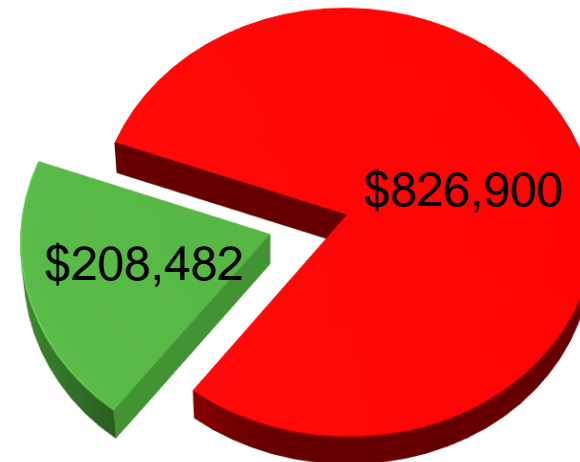
Actual Claim Costs for S/S-related Injuries over \$500

- 13 and Below* (30% of recruits) have created 80% of costs to date
- 14 and Above* (70% of recruits) have incurred 20% of costs to date

**Out of FMS composite score of 21*



Orange County Fire
Authority



FMS Past to Present

- U.S. Military
- U.S. Olympic Teams
- NFL
- NBA
- EPL
- MLB
- NHL
- D1 Universities
- Titleist Golf
- Equinox Fitness

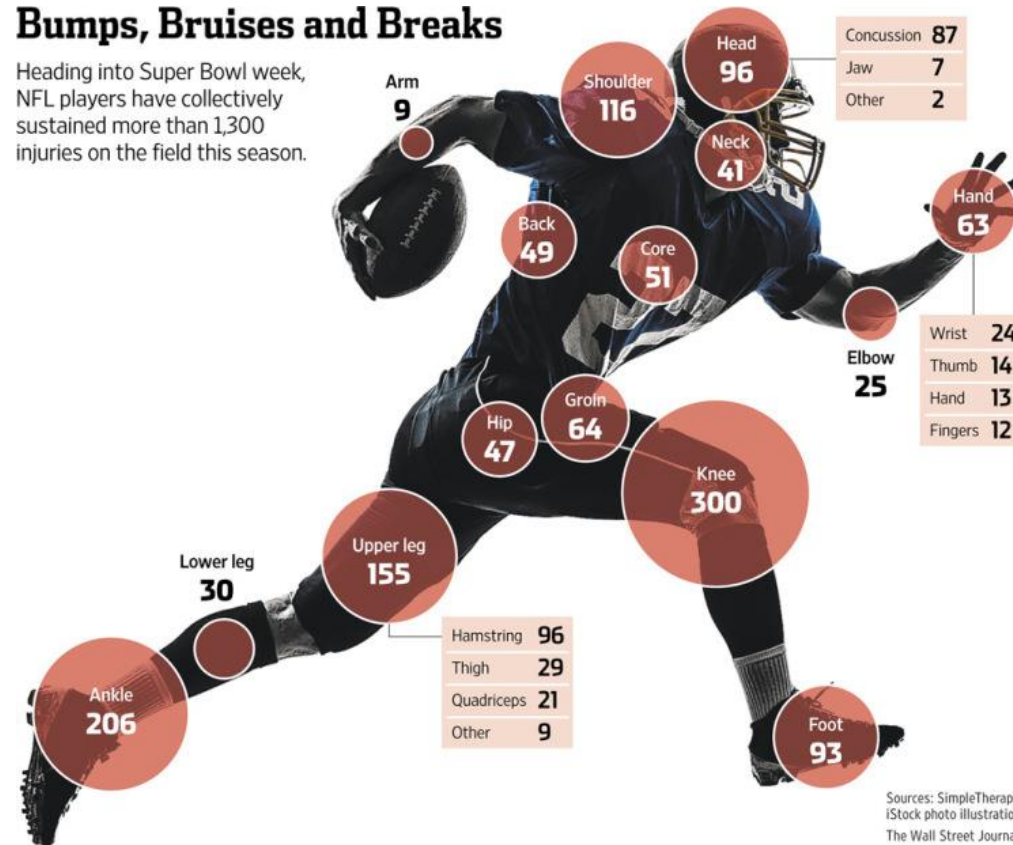


Why talk injury risk?

- Injury is inevitable, *or*
- Injury has already occurred

Bumps, Bruises and Breaks

Heading into Super Bowl week, NFL players have collectively sustained more than 1,300 injuries on the field this season.



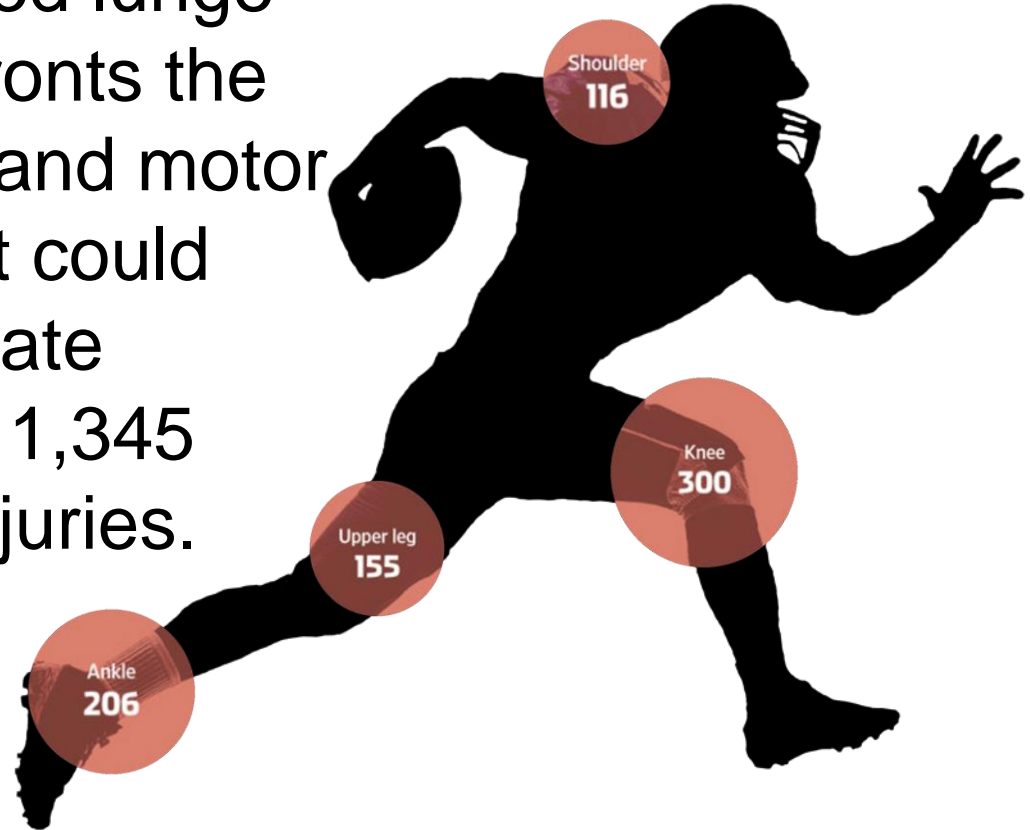
Sources: SimpleTherapy;
iStock photo illustration
The Wall Street Journal

Should we look at patterns or parts?



A standardized lunge pattern confronts the basic mobility and motor control that could complicate 777 out of 1,345 of these injuries.

58%



Perfect In-line Lunge Pattern:

A competitive advantage for those who actively manage it...



The **lunge pattern** is beginning to show its importance in other populations:

ARMY RANGERS:

Ankle DF ROM Asymmetry is predictive of lower extremity/spine injury.



What about other patterns?

Over 95% of golfers who can't perform an *overhead deep squat* lose their posture in their golf swing.

Dr. Greg Rose

Titleist Performance Institute





We've seen predictive qualities
in individual patterns . . .

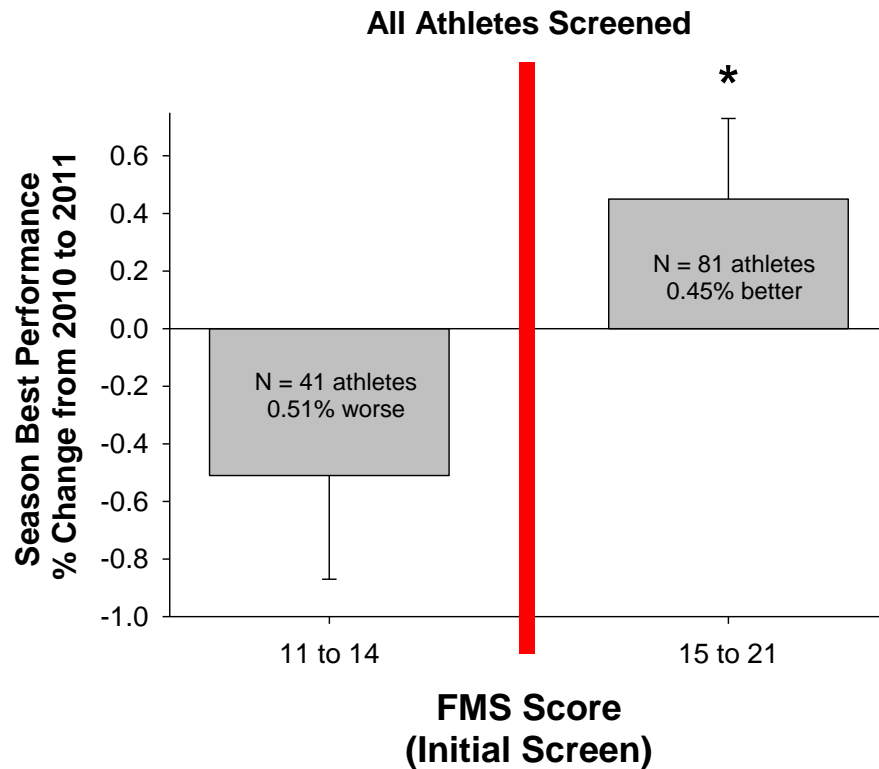


*. . . and the interplay of
multiple patterns has even
more powerful implications.*

Adaptability/Prediction

“Adaptation”

“Don’t train movement-fitness in the presence of movement-dysfunction. This data was collected in extremely elite athletes. I believe that the results would apply to developing athletes even more.”



Todd Arnold, MD - USATF Sports Performance Scientist



USATF™
Track & Field Long Distance Running Race Walking

FMS composite of 14 or below were twice as likely to drop out of USMC basic training due to injury.

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 Functional Movement Screening: Predicting Injuries in Officer Candidates. *Medicine & Science in Sports & Exercise*

“Poor movement leads to

- *preventable injuries,*
- *loss of duty time and*
- *poor physical performance in combat.*

FMS allows us to identify Marines who move poorly, but more importantly, prescribe exercises that correct these discrepancies.”

*– Maj Matt Zummo, USMC
Commanding Officer
Recruiting Station Orange*



Costs for Sprain/Strain Injuries

Academy 33-36 (4 recruit classes)

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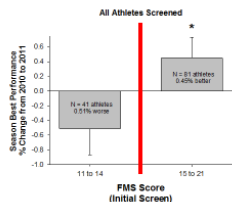


Orange County Fire Authority



FunctionalMovement.com

Adaptability/Prediction



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FunctionalMovement.com

14

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FunctionalMovement.com

Notice anything about the line between Vital Signs and Dysfunction in these diverse populations?

What do they have in common?

Movement

Action Point #1

You must be the ambassador for screening in your region,
because 20% of the individuals you screen need you . . .
they just don't know it yet.



Does your rehab team have a
Standard Operating Procedure (SOP)?
Is it this impressive?





Your rehab team's responsibility:

To investigate the dysfunctional or painful pattern and provide you the **vital impairments** responsible for those behaviors as well as the **prognosis** and **plan** of care for resolution and management.



Your responsibility:

To identify
dysfunctional patterns and painful patterns
on your examination.

This can be done in two minutes
(and will be the focus of our workshop).

Selective Functional Movement Assessment



1. Cervical Spine



2. Upper Extremity



3. Multi-Segmental Flexion



4. Multi-Segmental Extension



5. Multi-Segmental Rotation



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