Frontiers in Sports Injury Prevention:
The Functional Movement Screen

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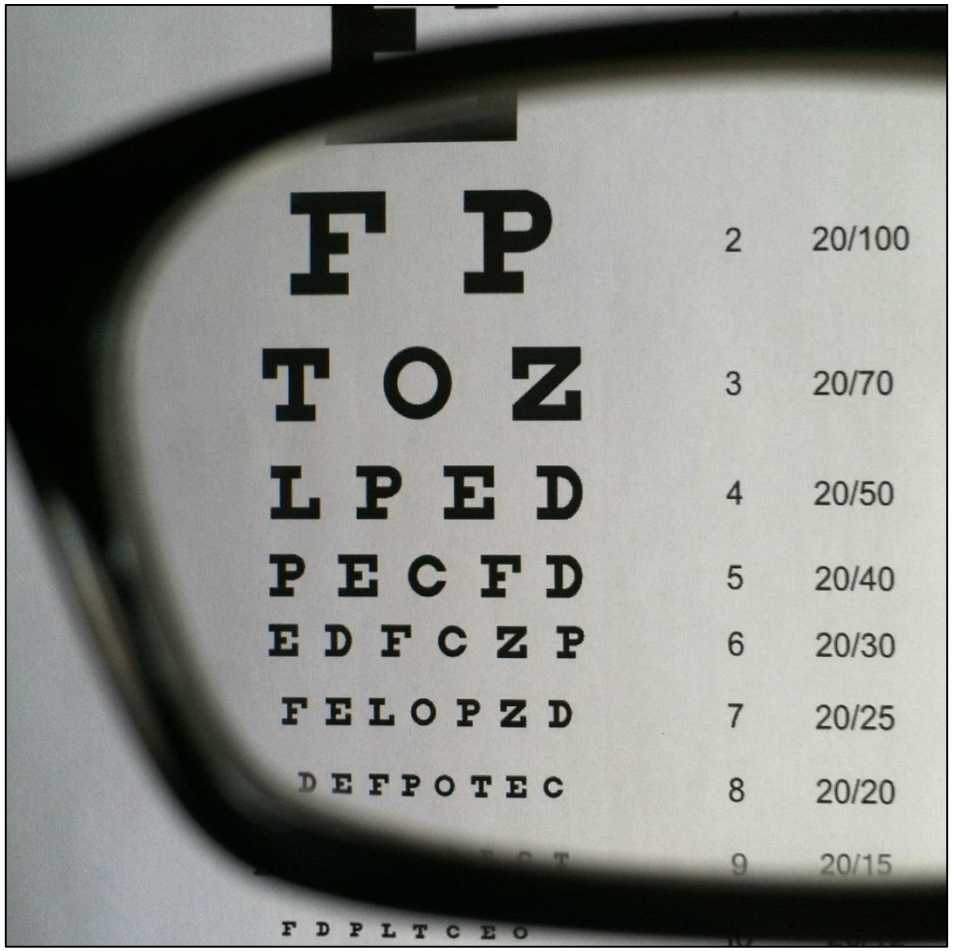
Our Functional Movement History

High School Athletics

- Bridge Gap between PPE And Performance Tests
- Functional biomarkers
- Movement vital signs
- Directed intervention

Screening creates *perspective*



Movement Patterns

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

FUNCTIONAL MOVEMENT SCREEN
(8-10 minutes)

*"What gets **measured** gets **done**"*

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

What does the research say?

- 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 FMS can be improved with interventions

FMS (Reliability)

Study	Journal	Results
Onate et al, 2012	*J Strength Cond Res*	The FMS total scores displayed high intersession and interrater reliabilities
Bribble et al,	*J Strength Cond Res*	Intrarater reliability is strong and seems to strengthen when the individuals are exposed to the FMS in a clinical experience.
Teyhen et al, 2012	*Journal of Orthopaedic & Sports Physical Therapy*	FMS composite score demonstrated moderate to good interrater and intrarater reliability
Smith et al, 2013	*J Strength Cond Res*	HS least Reliable test SM most reliable test
Gulan et al, 2014	*Int J Sports Ther*	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	*Clin Orthop Rel Res*	US Army Rangers	211	Asymmetrical ankle dorsiflexion & Pain with Functional Movement Screen clearing tests were associated with increased injury risk
Zalai et al,	*Hungarian Academy of Sciences*	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	*Int J Sports Phys The*	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	*Br J Sports Med*	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	JSR Journal of Sport Rehabilitation	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	*Medicine & Science in Sports & Exercise*	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., Kiesel, 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.

Kiesel, 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	*J Spec Oper Med*	Special Ops Soldiers	90	6 weeks	N	2.5
Cowen et al., 2010	*J Bodyw Mov Ther*	Firefighters	77	6 weeks	N	3.3
Kiesel et al., 2011	*Scand J Med Sci Sports*	Pro Football players	62	6 weeks	N	3.0
Frost et al., 2011	*J Strength Cond Res*	Firefighters	60	12 weeks	Y	NC

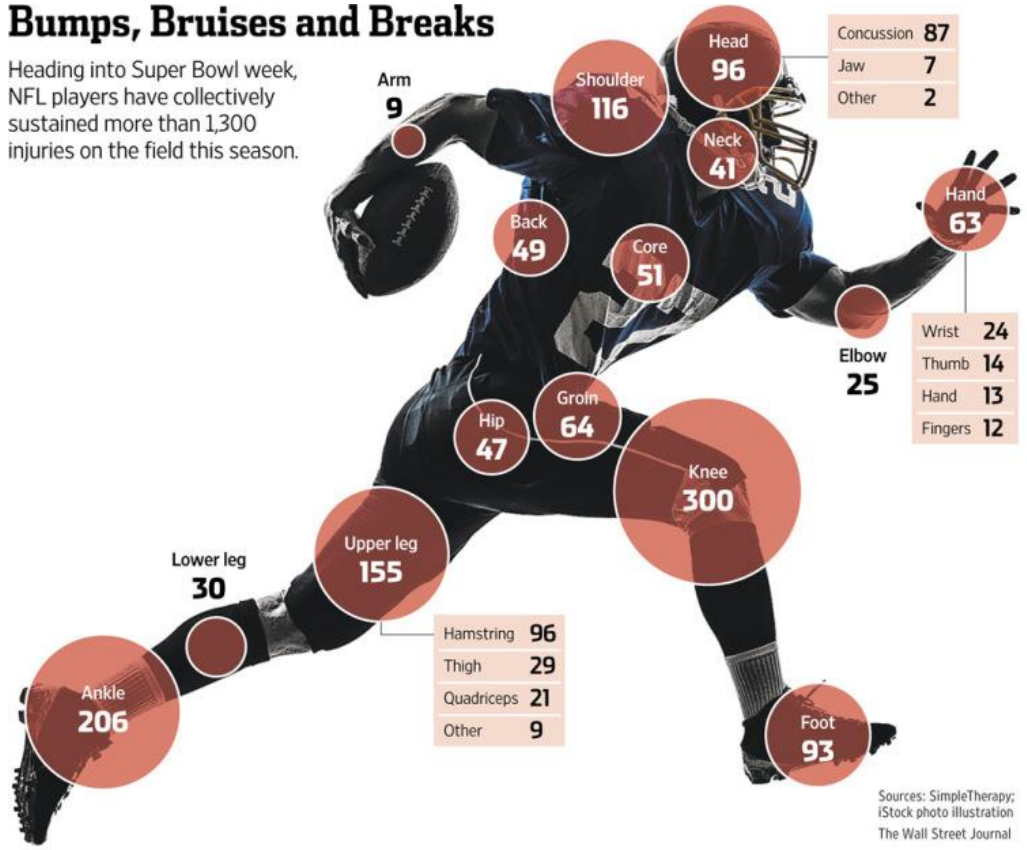
Movement training does not change FMS score
Not all training programs improve FMS results

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.

Why talk injury risk?

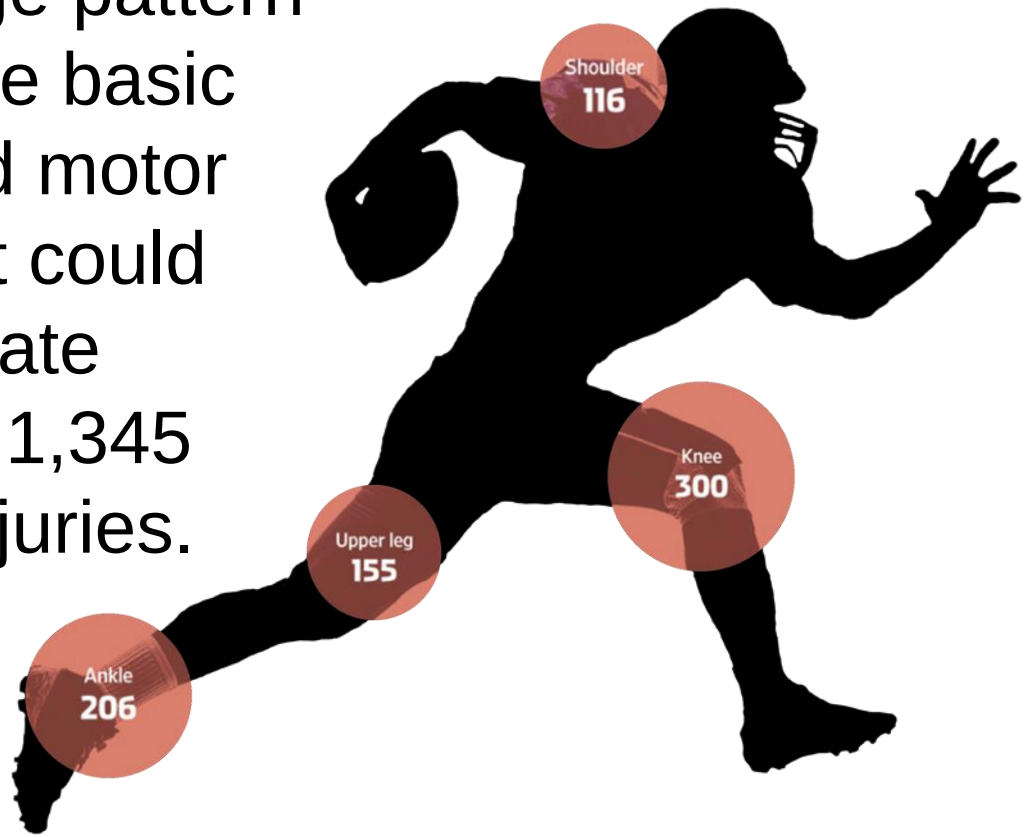
- Injury is inevitable, or
- Injury has already occurred



Should we look at patterns or parts?

The FMS 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…










Also the lunge pattern is beginning to show in and of itself as important

ARMY RANGERS: Ankle DF ROM Asymmetry is predictive

8-10 minute movement screen




FMS
FUNCTIONAL MOVEMENT SCREEN



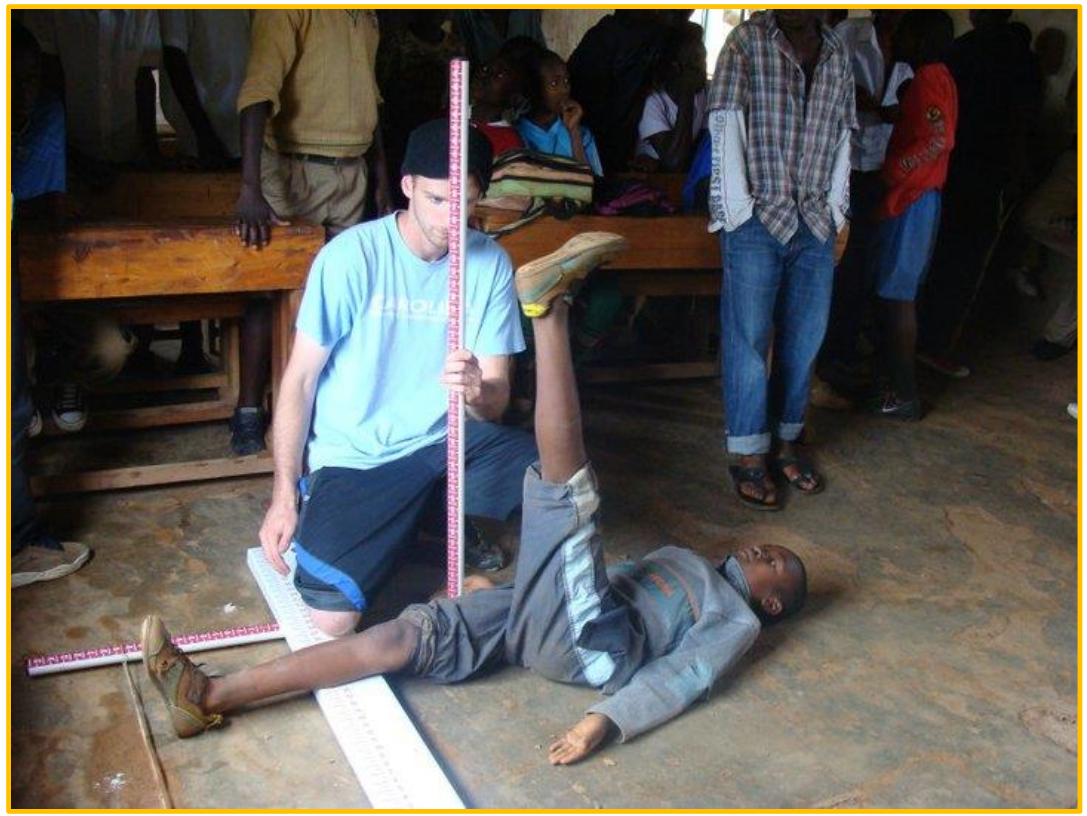
FMS move well. move often

FunctionalMovement.com

What is the "Real" Objective?

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

What Does the Evidence Suggest?



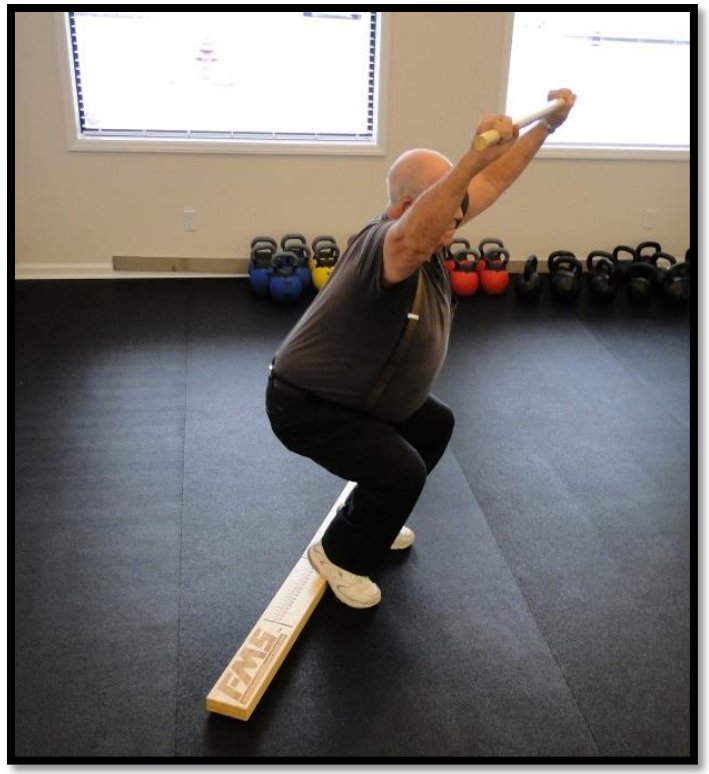
Injury Risk/Prediction

If goal is injury prediction or injury risk assessment you must “stack” risk factors…….

1. Previous injury
2. Severity of previous injury
3. Pain with any test
4. DF ROM symmetry
5. Performance on FMS - Functional Movement Screen

   YBT – Y Balance Test

The FMS has been effectively implemented in a variety of settings and populations.



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

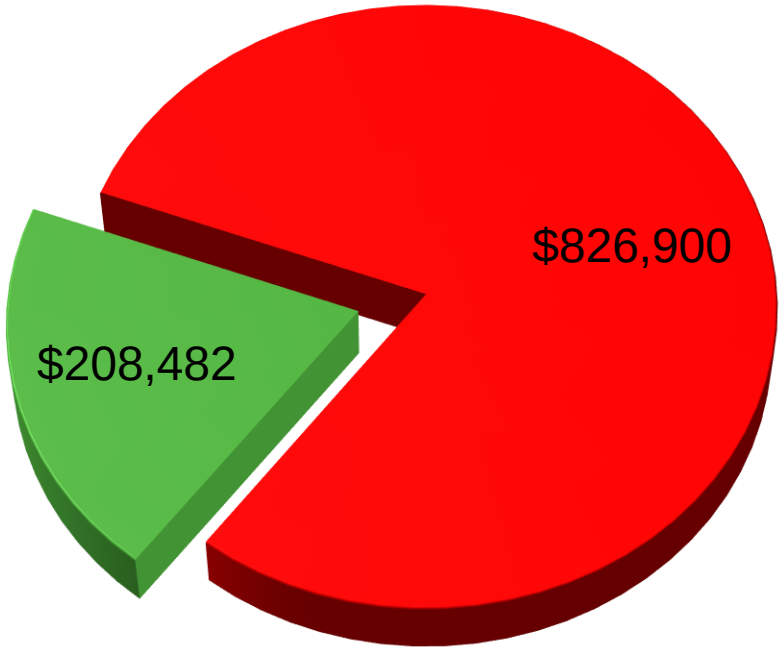
33% ↓ missed training days

Costs for Sprain/Strain Injuries

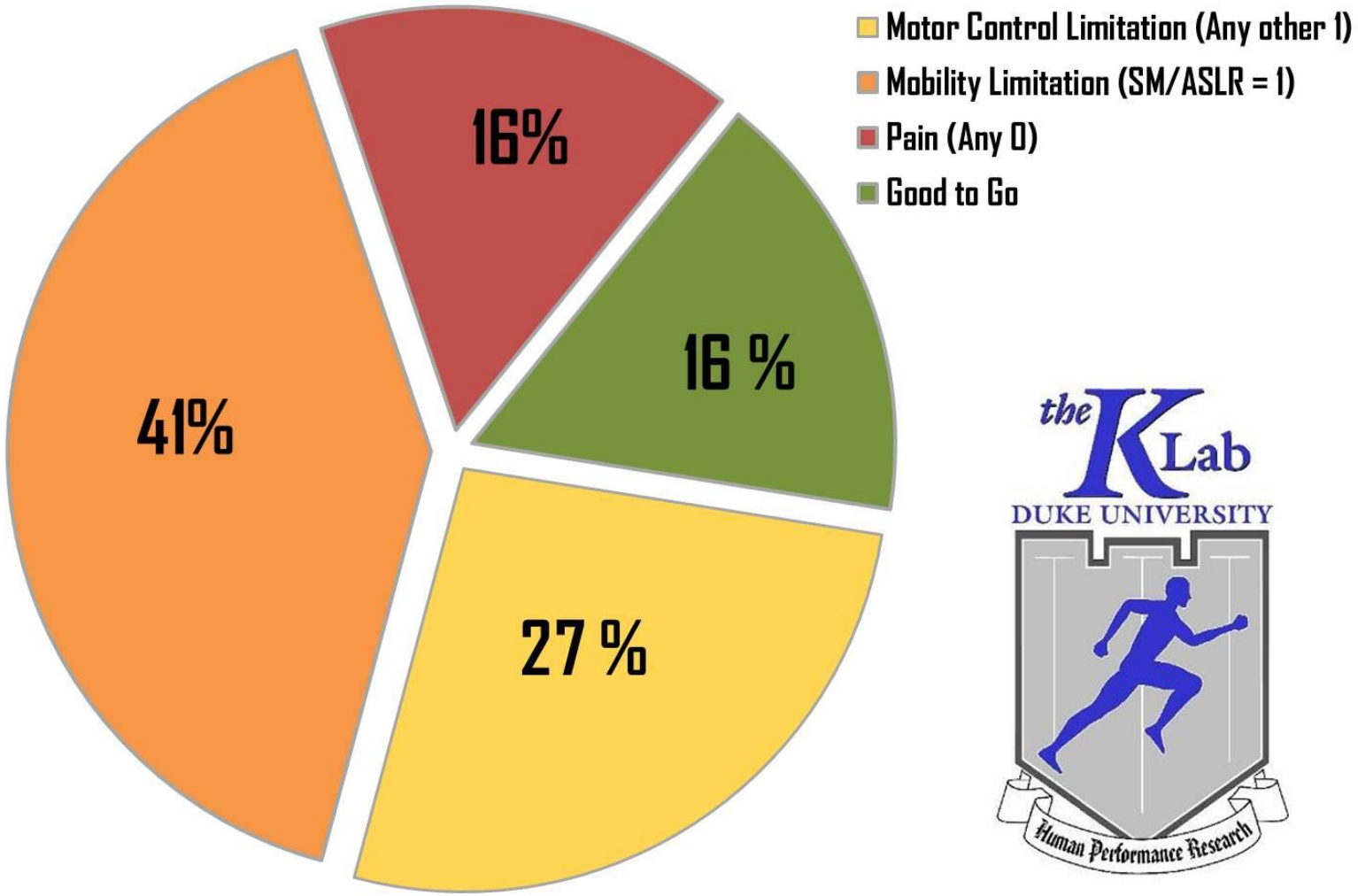
Academy 33-36 (4 recruit classes)
Actual Claim Costs for S/S-related Injuries over $500

- 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

Orange County Fire Authority

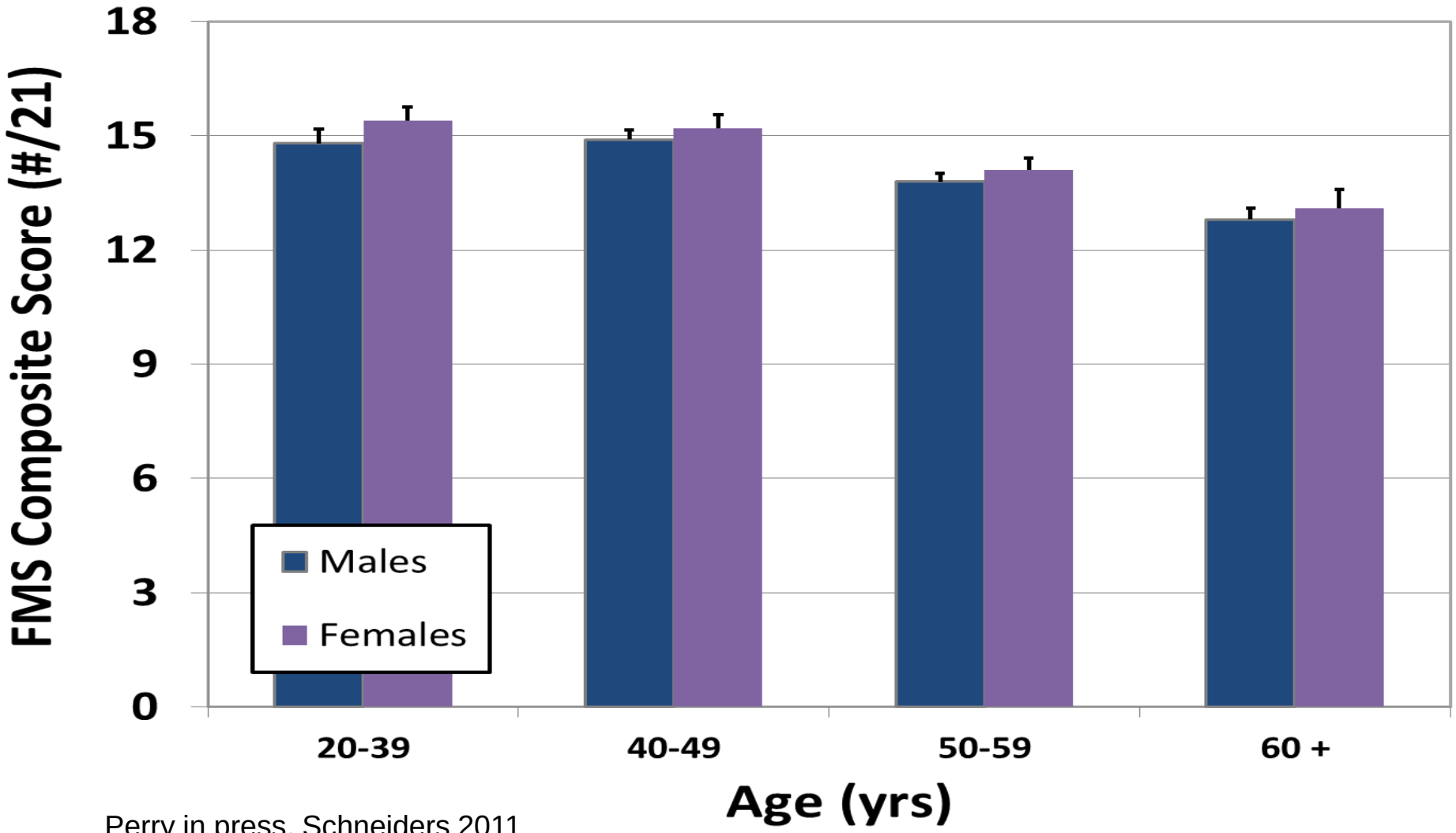


Movement Screening Utilization



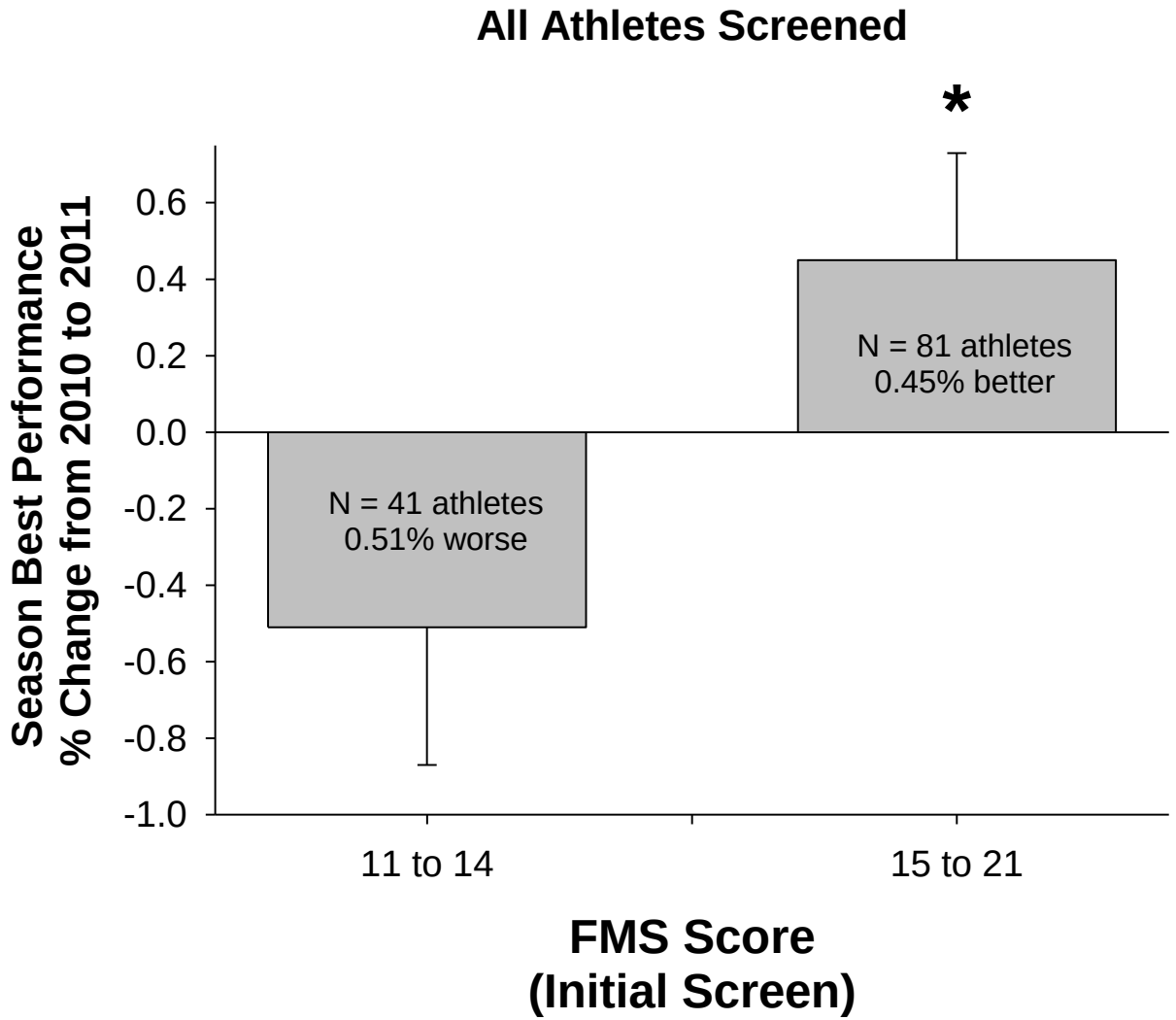
the KLab
DUKE UNIVERSITY
Human Performance Research

FMS: across age groups



Perry in press, Schneiders 2011

USATF Sports Performance Workshops



"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

Assess Structural Integrity

Movement Health – potential to grow

Screen Functional Patterns

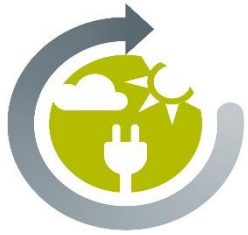
Movement Function – potential to learn

Test Movement Capacity

Movement Resources – energy expression

Evaluate Movement Complexity

Movement Resourcefulness – specific sport/activity skills

Why?	How It Happens		What to Look At?
	SA (*Organism)*	***ID** (Environment)*	
move well.			SFMA™ SELECTIVE FUNCTIONAL MOVEMENT ASSESSMENT
			FMS™ FUNCTIONAL MOVEMENT SCREEN
move often			FCS FUNDAMENTAL CAPACITY SCREEN
			

Hey, can I get a golf lesson?

SFMA™
SELECTIVE FUNCTIONAL MOVEMENT ASSESSMENT

Get Healthy!

Hey, can I get a golf lesson?

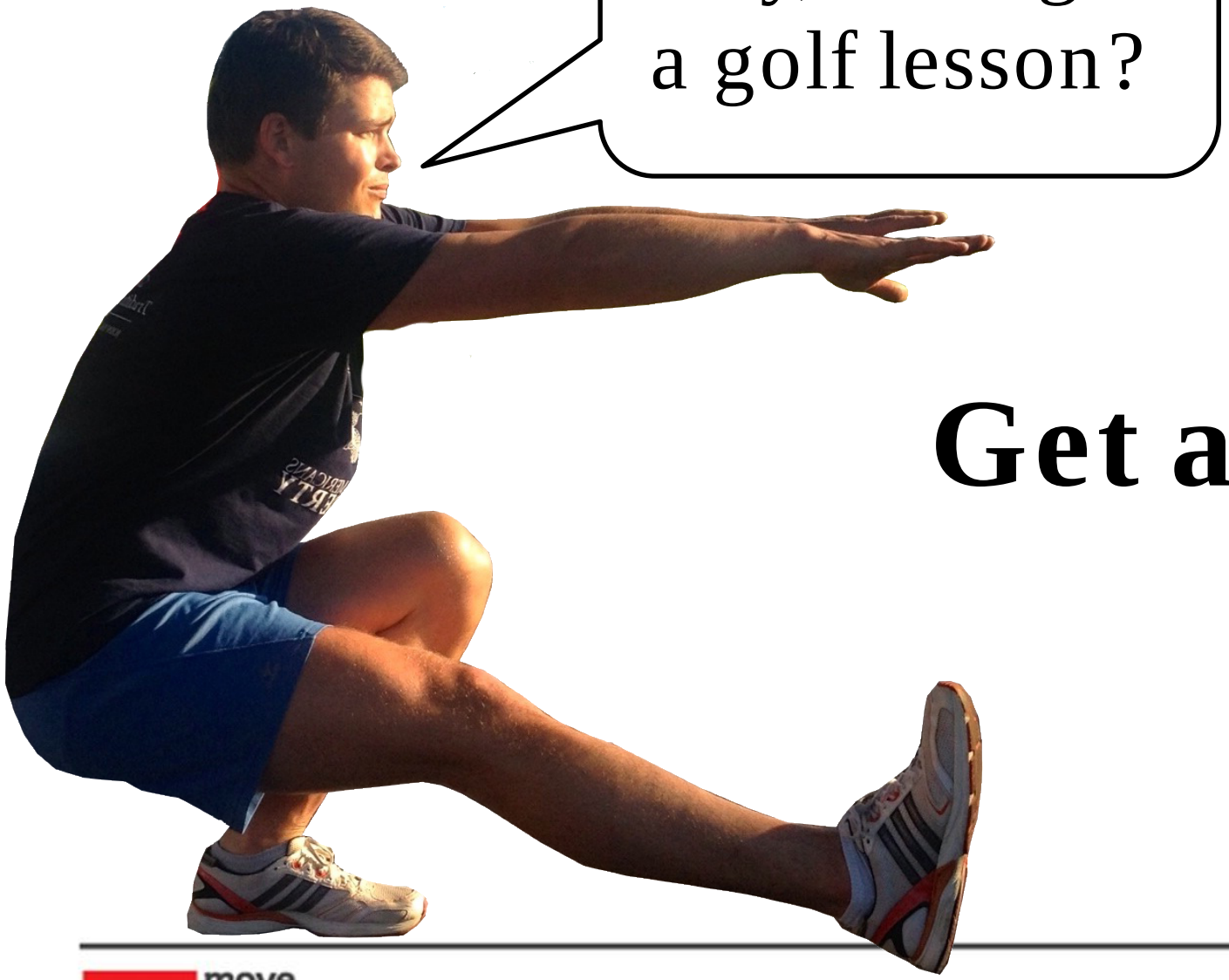
FMS™
FUNCTIONAL MOVEMENT SCREEN

Get Functional!

Hey, can I get a golf lesson?

FCS
FUNDAMENTAL CAPACITY SCREEN

Get Fit!



Get a Club!

Functional Movement Systems

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.

FMS move well. move often

FunctionalMovement.com

move well. move often


TAKE THE NEXT STEP
JOIN US FOR A LIVE COURSE, OR TAKE A COURSE ONLINE!
FMS
move well. move often
FunctionalMovement.com
Use your smartphone to scan the QR code to access exclusive content and learn more about FMS!
Use this code to register this weekend and save $75, or save $50 in the next 2 weeks!
Enter code at checkout.
bit.ly/fmsfall2015