

Komplexe Kniechirurgie

23.-24. November 2018

Holiday Inn City Centre München

Endoprothetik

Traumatologie

Sportorthopädie



**Orthopedium**  
Orthopedische Klinik



**Raum 4**

11:45-13:15 Uhr

**PRÄVENTION UND REHABILITATION**

Vorsitz: *Schmitt-Sody M. (Bernau),  
Stoffels T. (Berlin)*

Prävention von Knieverletzungen:  
ein internationaler Ansatz  
*Patt T. (Delft)*

12'+3'

Komplexe Kniechirurgie

**7. Jahreskongress  
der Deutschen  
Kniegesellschaft**

# Prävention von Knieverletzungen: ein internationaler Ansatz

thomas patt, delft, the netherlands





# 2008 ASTG Engelberg / CH





# Meta-Analysis of Prevention of ACL Injury: Neuromuscular Training programs Critical Elements and Efficacy

Timothy E. Hewett, PhD, FACSM

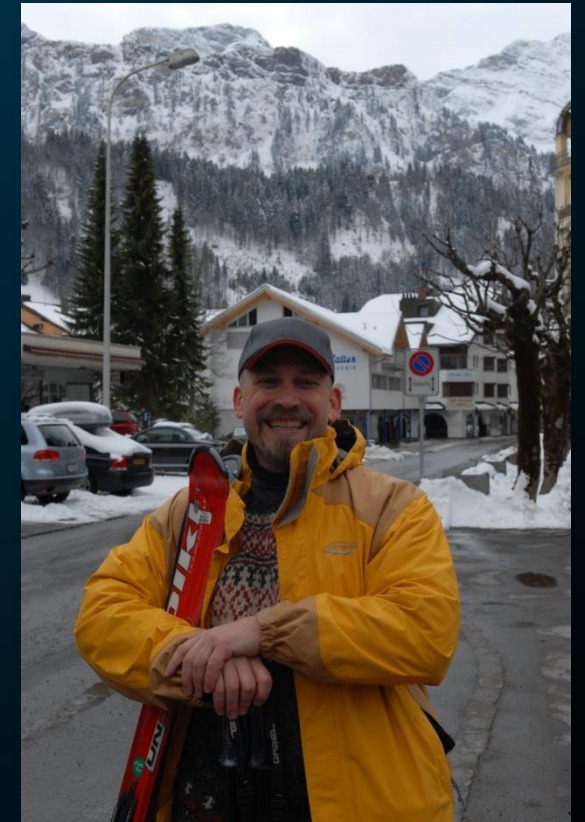
Director, Associate Professor

Cincinnati Children's

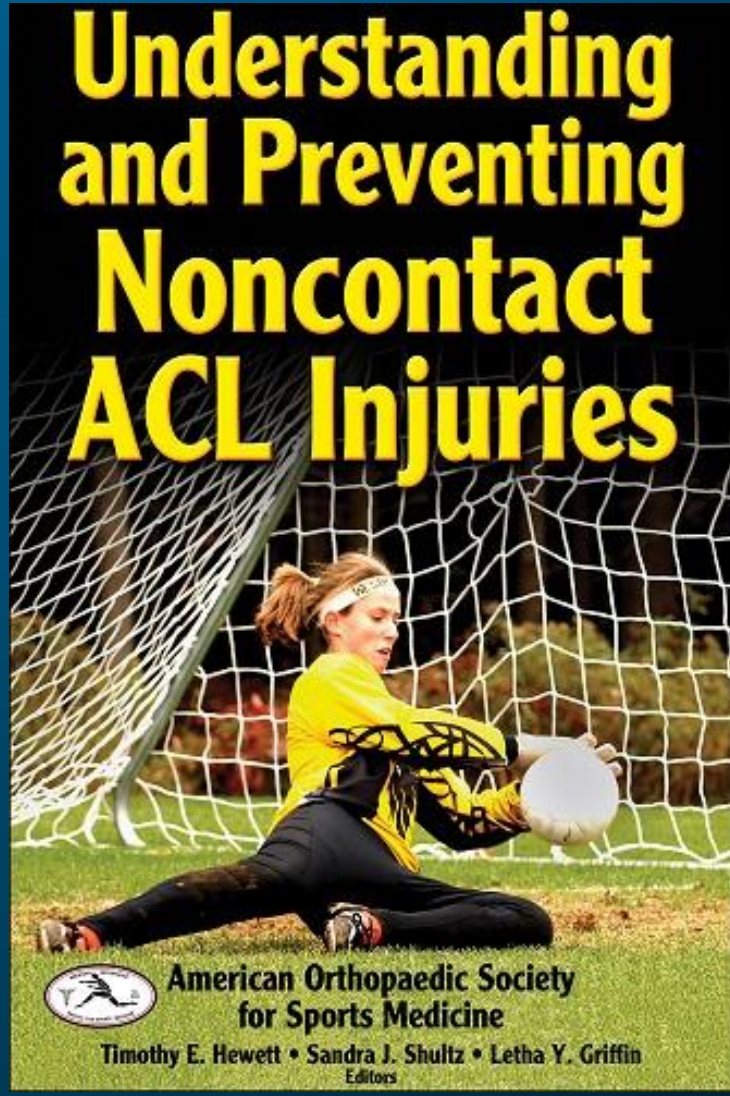
Sports Medicine Biodynamics Center

Human Performance Laboratory

University of Cincinnati College of Medicine:  
Pediatrics, Orthopaedic Surgery, Rehabilitation  
Sciences & Biomedical Engineering

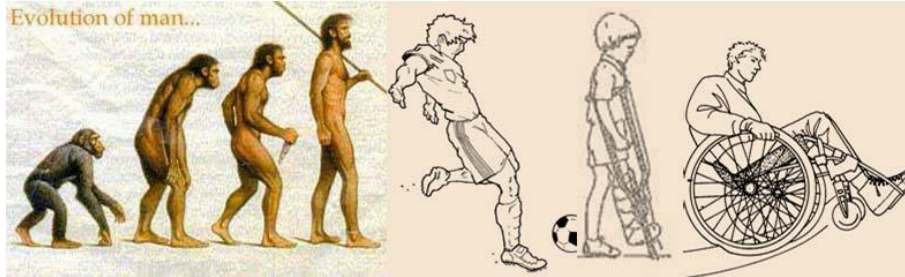




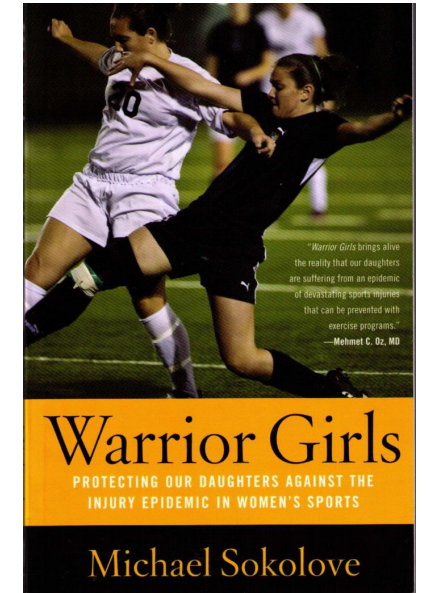




# the acl is the most common cause of the ex-athlete



1970 Kennedy



## acl rupture – life changing event

2010 Patt



## The Anterior Cruciate Ligament Study Group

Dedicated to the understanding, teaching and research of the knee

[Home](#) [History](#) [Mission Statement](#) [Members](#)

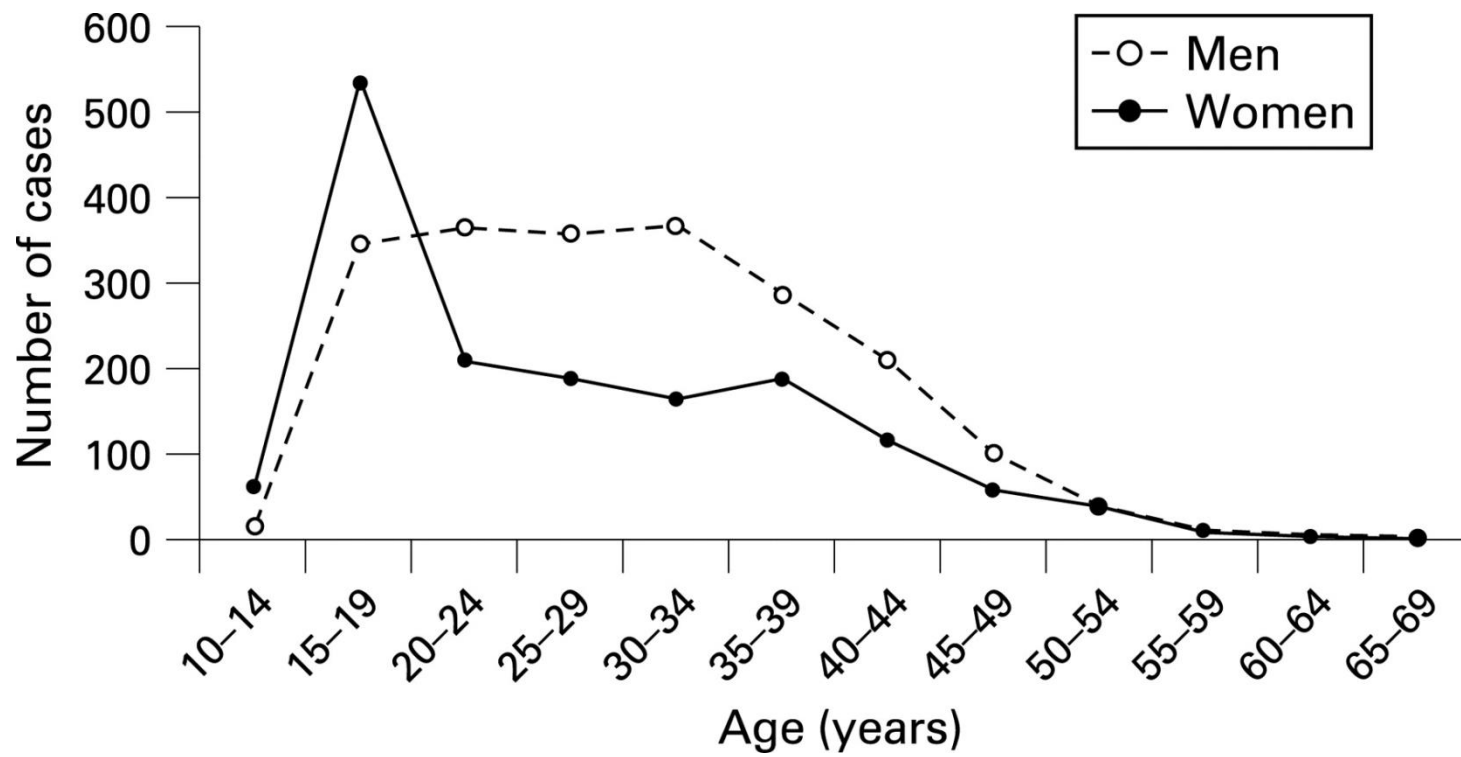
### Mission Statement

*“The mission of the ACL Study Group is to advance the art and science of knee soft tissue surgery, rehabilitation, and injury prevention through the exchange of scientific information and debate. The ACL Study Group is committed to scientific integrity, free of financial or personal conflict of interest.”*

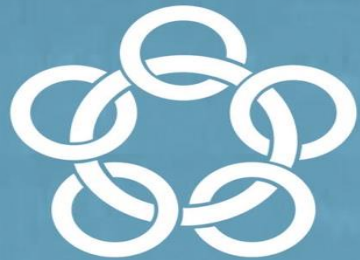




## Gender difference



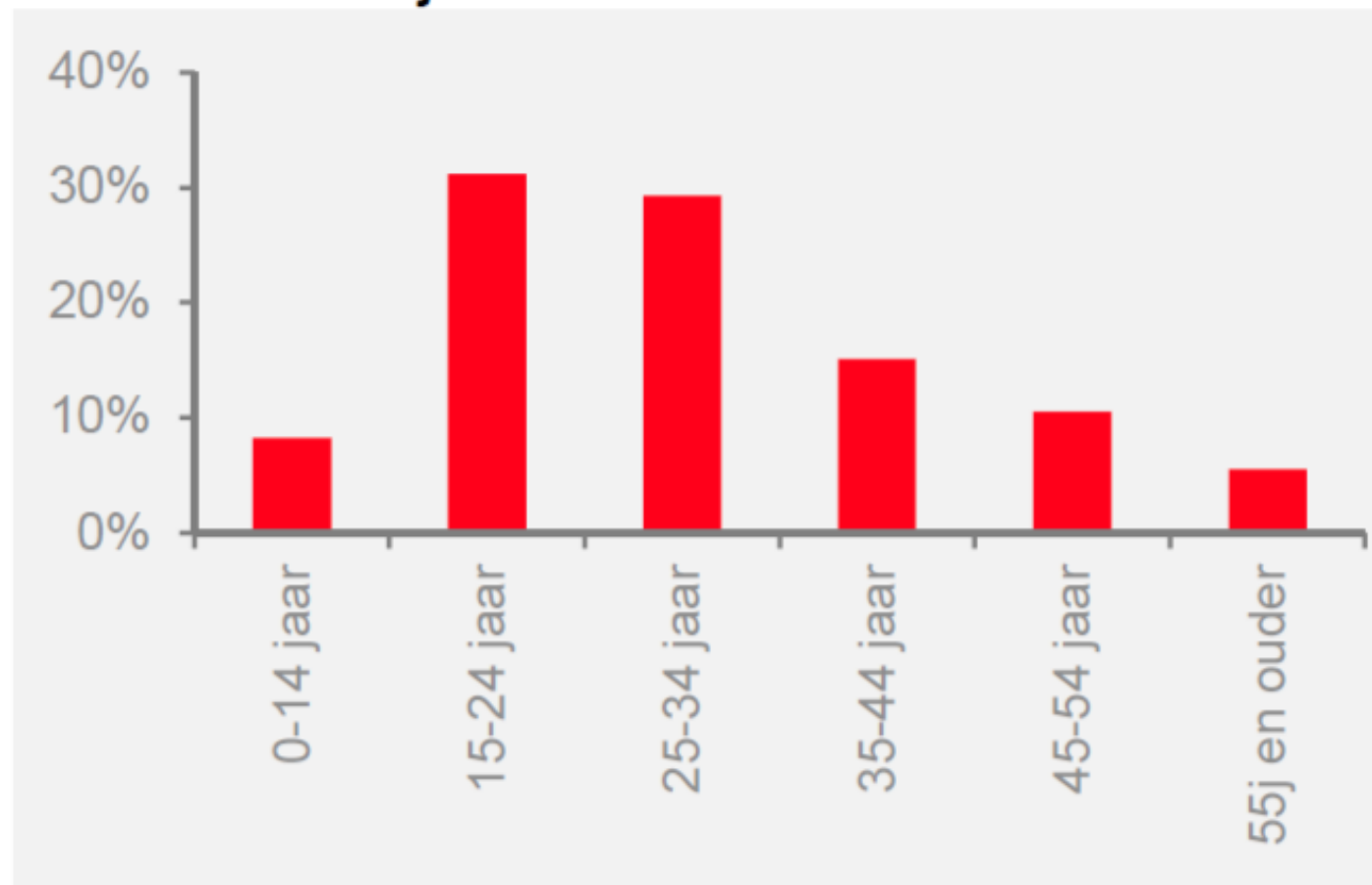
*Brit. J. Sports Med. 2008; 42: 394-412*





## age

**Figuur 2 Knieblessures in 2012: aandeel naar leeftijd**



Bron: Ongevallen en Bewegen in Nederland 2012, VeiligheidNL





# Increasing rates of anterior cruciate ligament reconstruction in young Australians, 2000–2015

David Zbrojkiewicz<sup>1,2</sup>, Christopher Vertullo<sup>1,3</sup>, Jane E Grayson<sup>1</sup>

**The known** Rupture of the anterior cruciate ligament (ACL) is a common and devastating injury that is largely preventable by neuromuscular agility training.

**The new** The incidence of ACL reconstructions in Australia is the highest in the world, and is increasing. At greatest risk are men aged 20–24 years and women aged 15–19 years, but incidence is increasing most rapidly among 5–14-year-old children. The incidence of revision ACL is increasing more rapidly than that of primary ACL reconstructions.

**The implications** These findings justify establishing a national ACL injury prevention program and an ACL reconstruction registry to improve outcomes for active young Australians.

**Abstract**

**Objectives:** To investigate the incidence and demographic features of anterior cruciate ligament (ACL) reconstructions in Australia by age and sex, and to determine whether the incidence has changed during the past 15 years.

**Design and setting:** Descriptive epidemiological analysis of longitudinal data on ACL reconstructions (July 2000 – June 2015) in the National Hospital Morbidity Database.

**Main outcome measures:** Population ACL reconstruction rates, by age group and sex.

**Results:** 197 557 primary ACL reconstructions were performed during the study period; the annual incidence increased by 43% (from 54.0 to 77.4 per 100 000 population), and by 74% among those under 25 years of age (from 52.6 to 91.4 per 100 000 population). In males, the peak incidence in 2014–15 was for 20–24-year-olds (283 per 100 000 population); for females, it was for 15–19-year-olds (164 per 100 000 population). Annual growth in incidence was greatest in the 5–14-year-old age group (boys, 7.7%; girls, 8.8%). Direct hospital costs of ACL reconstruction surgery in 2014–15 were estimated to be \$142 million. The annual incidence of revision ACL reconstructions increased from 2.49 (2000–01) to 5.65 per 100 000 population (2014–15), or by 5.6% per year; revisions as a proportion of all ACL reconstruction increased from 4.4% to 6.8%.

**Conclusions:** The increasing incidence of ACL reconstructions in young Australians over 15 years is worrying. The individuals at greatest risk are men aged 20–24 years and women aged 15–19 years; the rate of reconstruction is increasing most rapidly among those aged 5–14 years. Revision rates are increasing more rapidly than those of primary reconstructions.

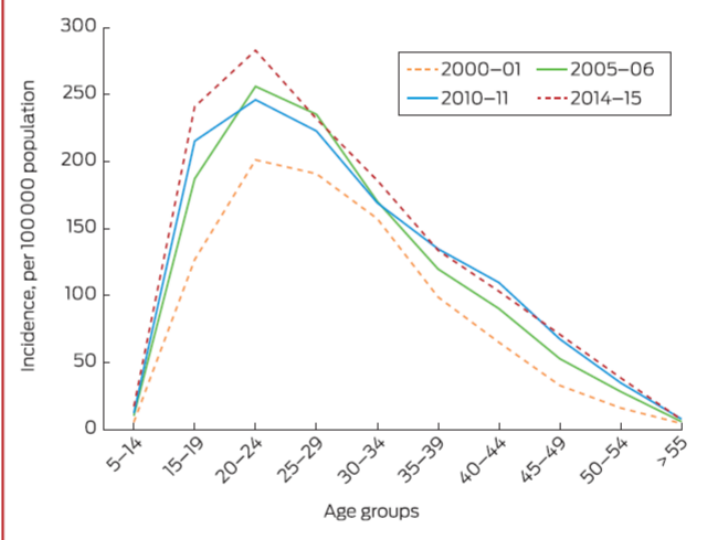


David Zbrojkiewicz, Christopher Vertullo and Jane E Grayson  
Med J Aust 2018; 208 (8): 354-358

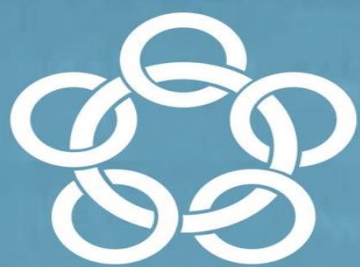
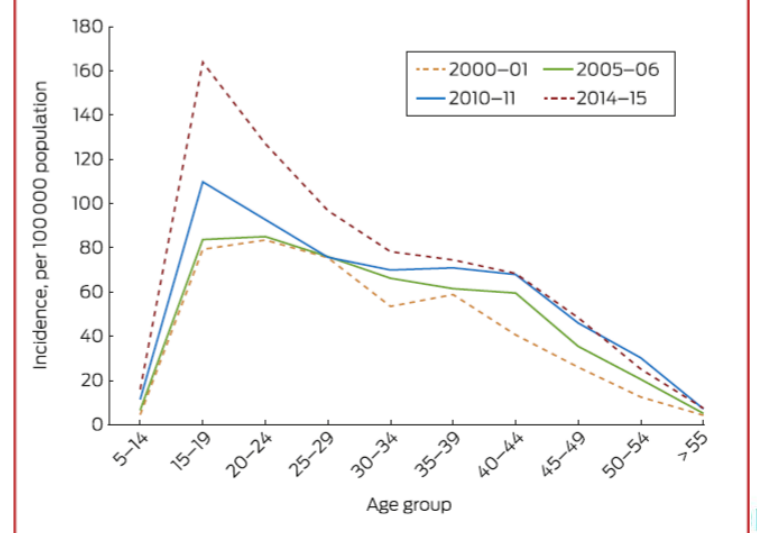
**overall growth in incidence in acl# 43 %  
in patients <25 years of age 74%  
annual growth greatest in agegroup 5-14 yrs**



**2 Incidence of primary anterior cruciate ligament reconstruction in males, 2000–2015, by age group**



**3 Incidence of primary anterior cruciate ligament reconstruction in females, 2000–2015, by age group**



## 4 main neuromuscular mechanisms

- Ligament Dominance
- Quadriceps Dominance
- Trunk Dominance
- Leg Dominance



ACL prevention interventions  
addressing all four mechanisms  
is crucial !!



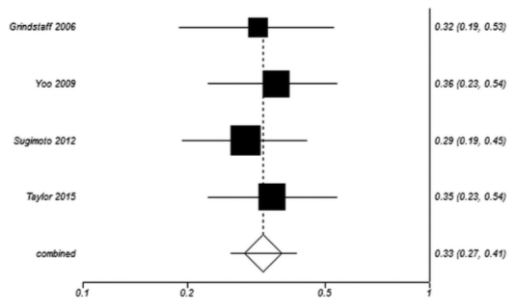
# Meta-Analysis of Meta-Analyses of Anterior Cruciate Ligament Injury Reduction Training Programs

Kate E. Webster & Timothy E. Hewett

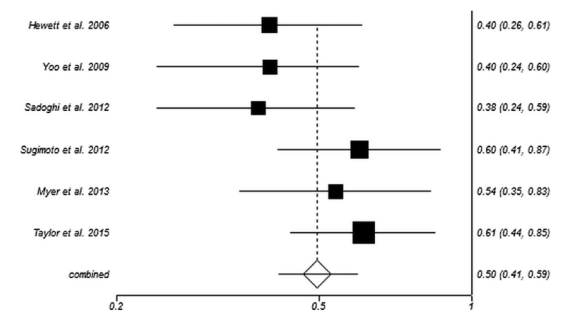
Received 23 January 2018; accepted 27 April 2018

Summary meta-analysis showed an **overall 50% reduction in the risk of all ACL injuries in all athletes** and a **67% reduction for non-contact ACL injuries in females**. This paper combines all previous meta-analyses into a single source and shows conclusive evidence that ACL injury prevention programs reduce the risk of all ACL injuries by half in all athletes and non-contact ACL injuries by two-thirds in female athletes. There is insufficient data to make conclusions as to the effectiveness of ACL injury prevention programs in male athletes. 2018 Orthopaedic Research Society.

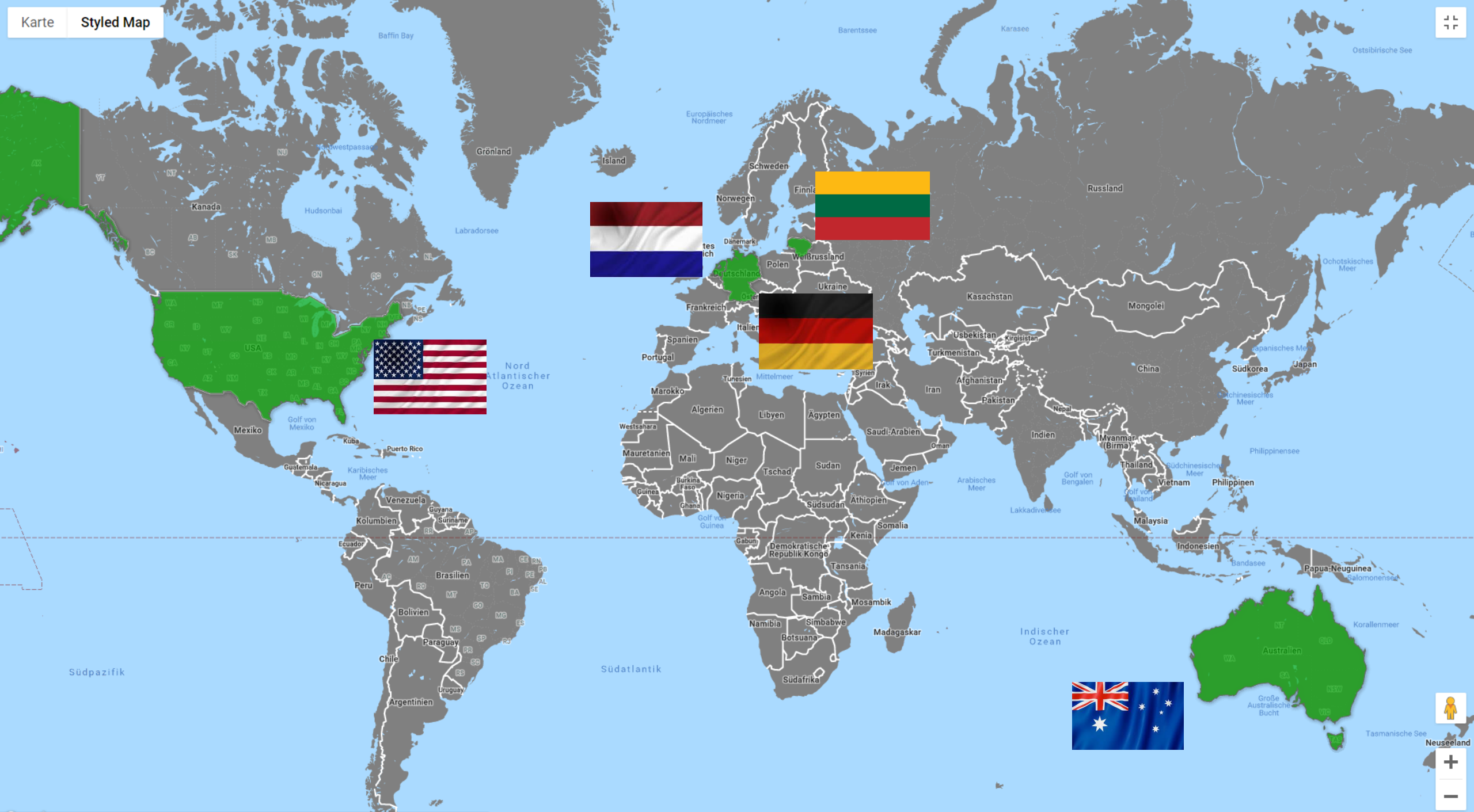
Published by Wiley Periodicals, Inc. J Orthop Res 9999:1–13, 2018.



**Figure 3.** Summary meta-analysis of the meta-analyses for non-contact ACL injuries in females that demonstrated a 67% reduction (OR=0.33 [0.27–0.41];  $I^2=15%$ ) in the risk of non-contact ACL injuries.



**Figure 2.** Summary meta-analysis of the meta-analyses for all ACL injuries in all athletes that demonstrated a 50% reduction (OR=0.50 [0.41–0.59];  $I^2=15%$ ) in the risk for all ACL injuries.



Neuseeland



# Prävention Skiverband München

## Dr. Christian Wimmer



- Screening-Tests der Nachwuchskader im Sommer
- Back-in-Action-Test (Corehab) für funktionelle Stabilität
- Rücksprache mit Trainer-Team bzgl. Defizite und Trainingssteuerung





# Litauen



Assoc. Prof. Laimonas Šiupšinskas PT, MPH, PhD,  
Lithuanian University of Health Sciences  
Medical Academy  
Institute of Sports  
Kaunas, Lithuania

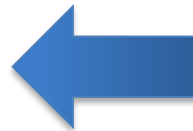
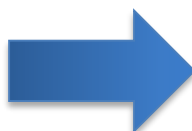


**PRAKTINIS IR TEORINIS SEMINARAS**

APATINIŲ GALŪNIŲ SPORTINIŲ TRAUMŲ  
DIAGNOSTIKA, GYDYMAS IR KINEZITERAPIJA

Lektoriai

Doc. dr. Laimonas Šiupšinskas  
Asocij. profesorius Rimtautas Gudus

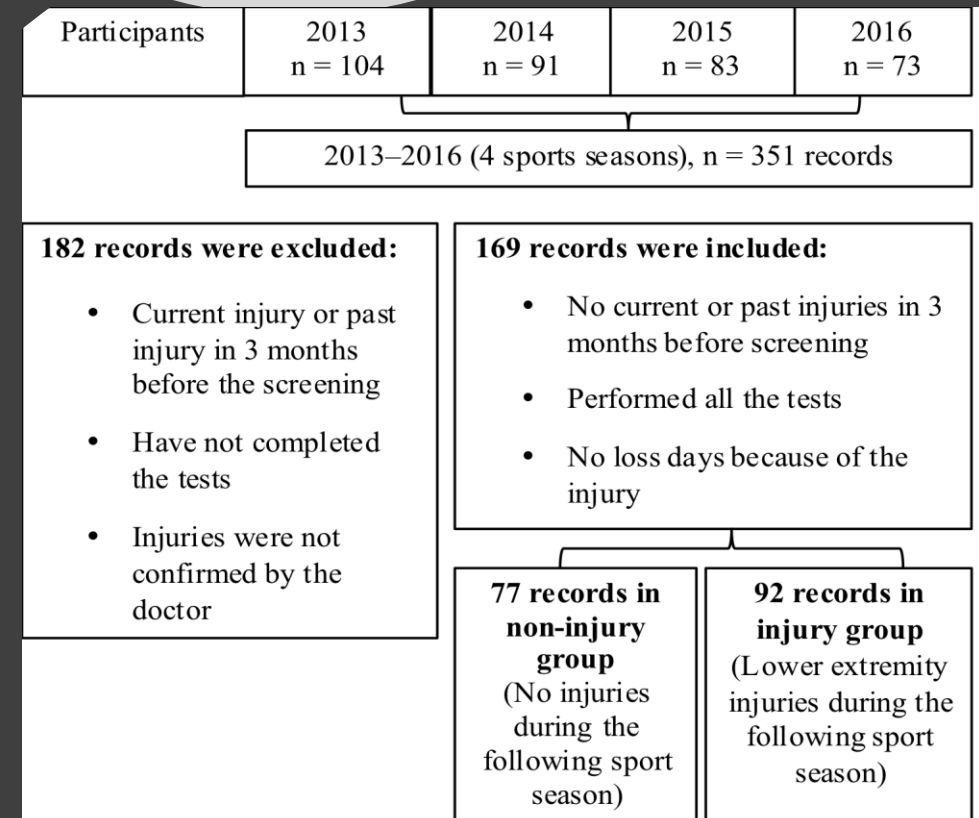


Prof. Rimtautas Gudus, MD, PhD  
Head of Sports Trauma and Arthroscopy Unit  
Sports Institute  
Hospital of Lithuanian University of Health Sciences



# Pre-season musculoskeletal screenings

- Seven 1st division women basketball teams were screened during pre-season preparation
- Data collection of sports injuries during the sports season
- Functional tests were used to identify the deficits in musculoskeletal system associated with risk of non-contact sports injuries

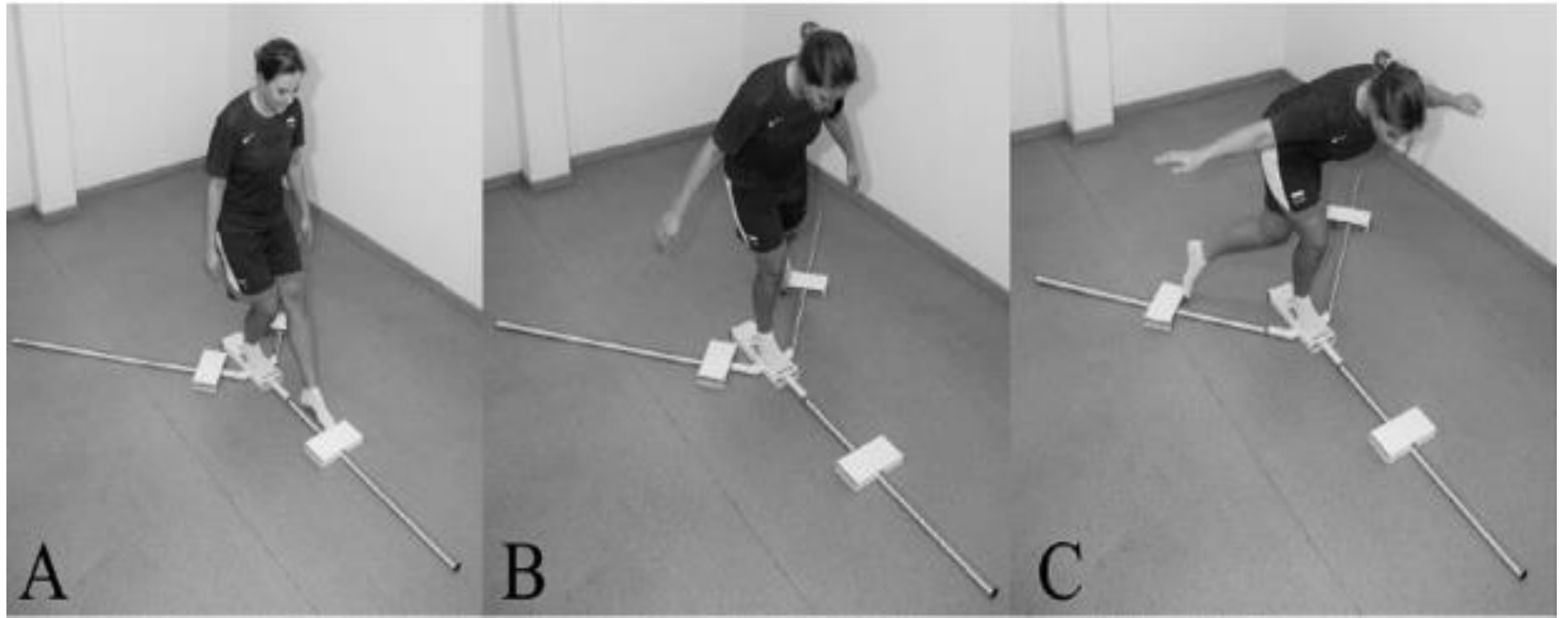


# FMS - Functional movement screen

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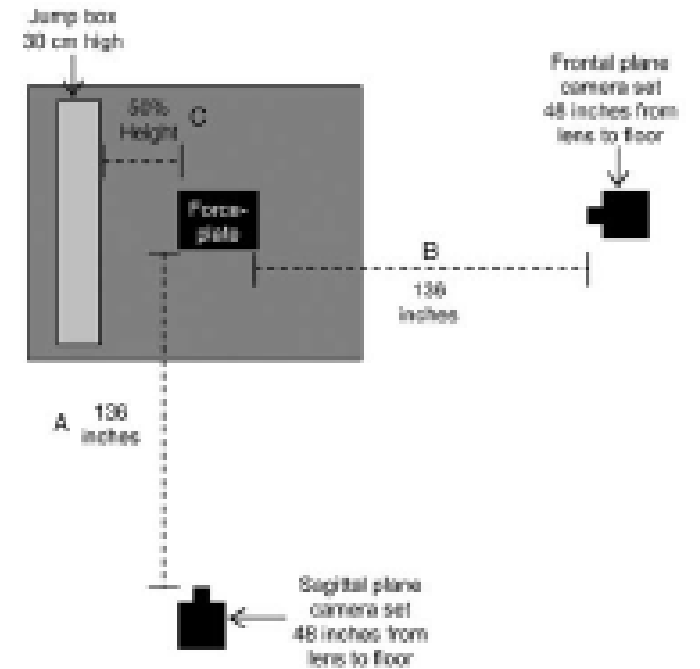
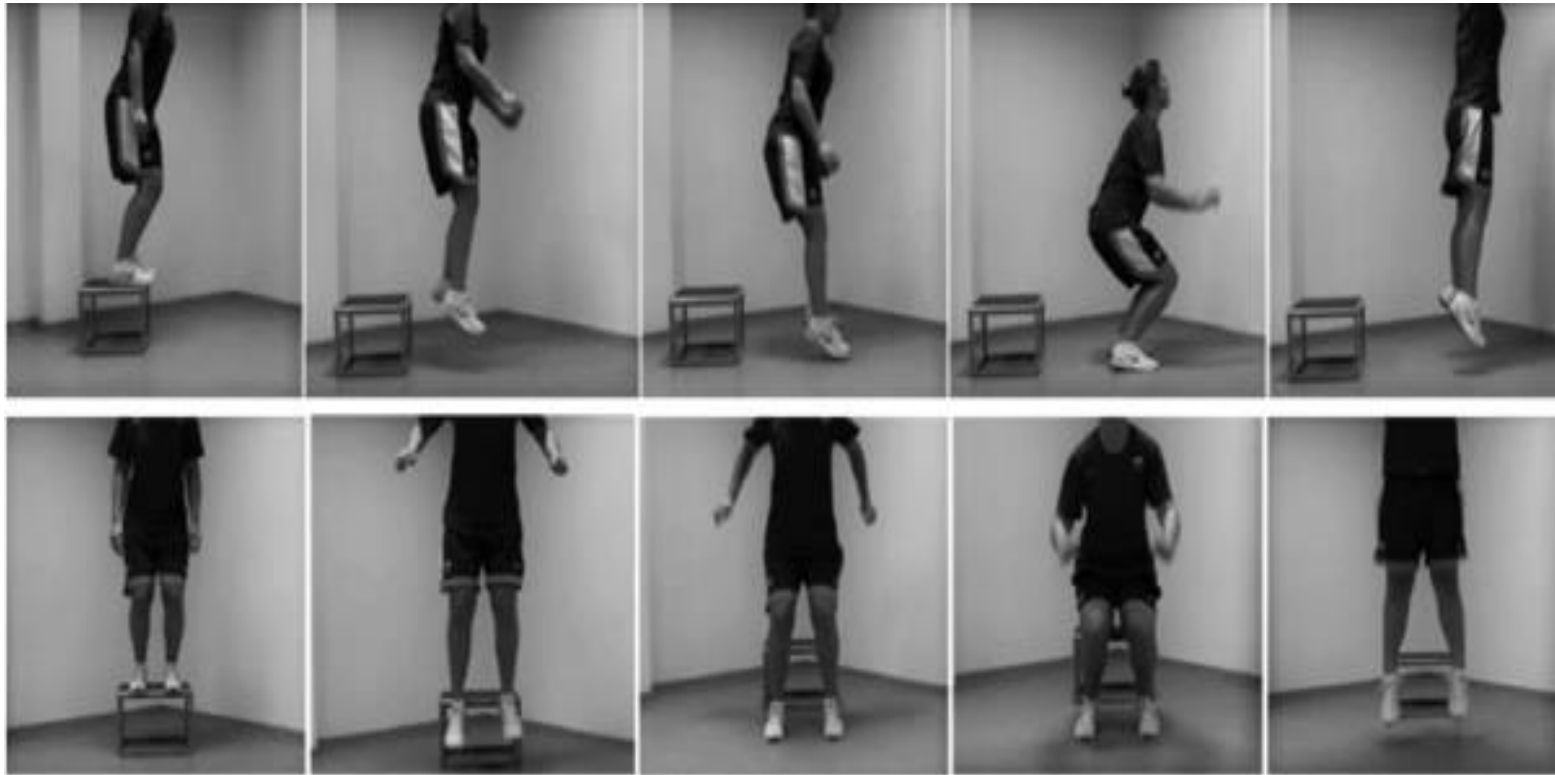






# Y balance test

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## Drop vertical jump test evaluated with LESS (Landing Error Scoring System)

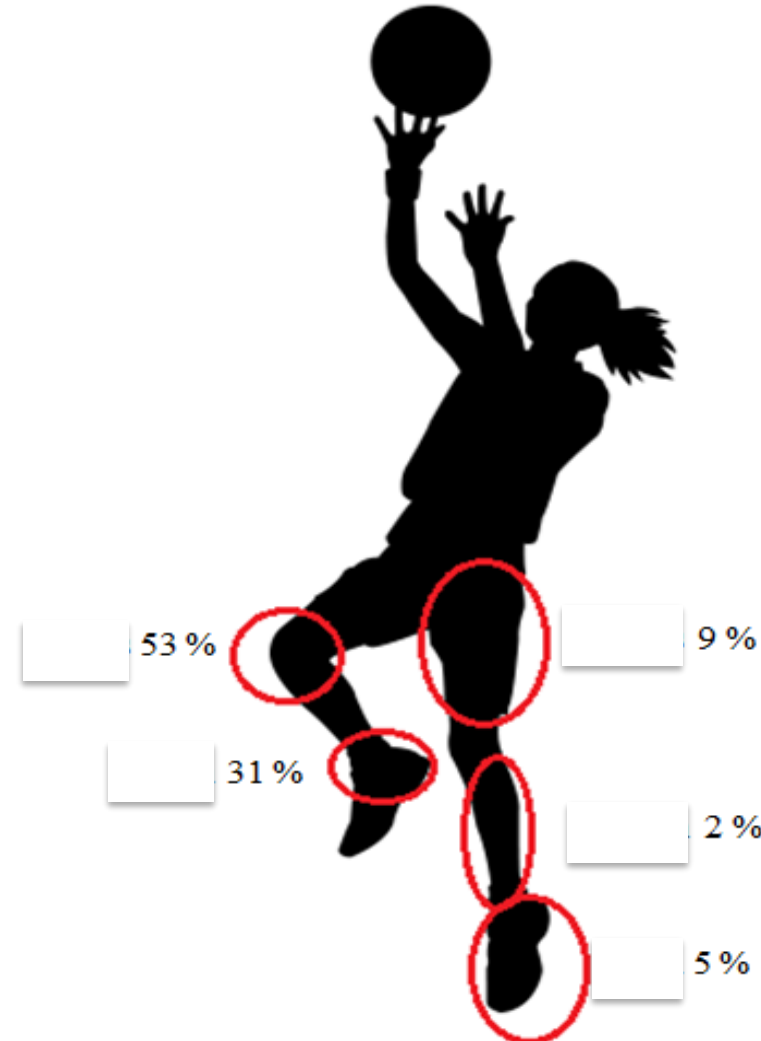




# Lower extremity injuries in lithuanian professional women basketball players in 2013–2016



Injuries	n	%
Knee ACL, MCL, LCL injuries	20	21.7
Acute ankle ligaments injuries	14	15.2
Chronic ankle ligaments tendinopathy	13	14.1
Knee cartilage, meniscal injuries	12	13
Chronic patellar tendinopathy	6	6.5



# Association of the functional tests with sports injuries in elite female basketball players (Lithuania)

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## Conclusion

- Faults of functional movement patterns and poor jump landing biomechanics during pre-season screening were associated with lower extremity injuries in elite female basketball players.
- Impairments of dynamic stability of lower extremities were not associated with injury rates in our population.
- The combination of functional tests can be used for injury risk evaluation in female basketball players.







BOOK- Sports injuries: diagnostics, treatment, rehabilitation and prevention

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49<sup>th</sup> WMTS  
CHAMPIONSHIP  
2019

CONGRESS REGISTRATION VENUES ACCOMMODATION SOCIAL EVENTS PRACTICAL INFORMATION CONSTITUTION WMTS ABOUT VILNIUS

**49<sup>th</sup> WMTS**  
CHAMPIONSHIP 2019

TOURNAMENT COUNTDOWN

254	7	52	58
DAYS	HOURS	MINUTES	SECONDS

2019 08 03-09 Vilnius, Lithuania



WMTS

World Medical  
Tennis Society

# Australian Youth Sports Injury Prevention

1 No National Prevention Program

2 All programs are ad hoc and local

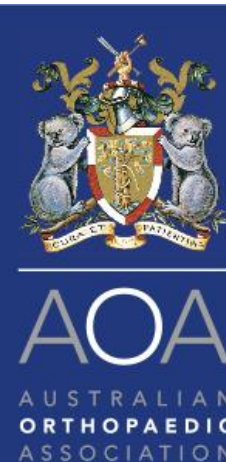
3 Australian Orthopaedic Association has been advocating for a National Sports Injury Prevention Program since 2014



DR CHRISTOPHER VERTULLO  
MBBS FRACS PhD



**GCORE**  
Menzies Health Institute  
Gold Coast, Australia







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[SUPPORT](#)



**Safe Sport for Kids:**

**Because prevention is  
always better than a  
cure.**

# AOA Advocacy - “Safe Sports for Kids”

## 1 Published Research

The Cost-Benefits of National Prevention  
The Rising incidence of ACLR Nationally



## 2 AOA Youth Sports Injury Prevention Working Group

All major sporting codes are stakeholders

All major clinical groups are stakeholders

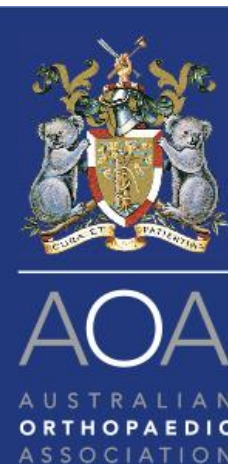
Lobbying Federal Gov for National Sports Injury Prevention

Program **(as of october 2018)**

DR CHRISTOPHER VERTULLO  
MBBS FRACS PhD



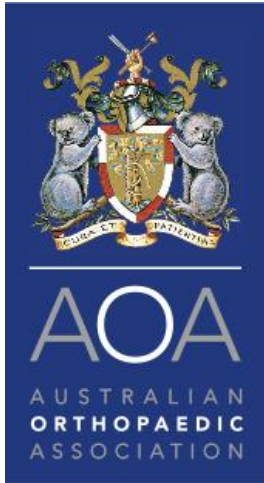
**GCORE**  
Menzies Health Institute  
Gold Coast, Australia







AFL Doctor's Association



# Youth Sports Injury Prevention Working Group Stakeholders





**From:** Helen Samardzic <[Helen.Samardzic@parliament.nsw.gov.au](mailto:Helen.Samardzic@parliament.nsw.gov.au)>  
**Subject:** FW: FOLEY & VOLTZ: LABOR'S PLAN TO HELP PREVENT KNEE INJURIES IN YOUNG SPORTSPEOPLE \*audio attached  
**Date:** 5 November 2018 at 9:42:20 am AEST  
**To:** ""[david.hunter@sydney.edu.au](mailto:david.hunter@sydney.edu.au)"" <[david.hunter@sydney.edu.au](mailto:david.hunter@sydney.edu.au)>  
""[chris.vertullo@icloud.com](mailto:chris.vertullo@icloud.com)"" <[chris.vertullo@icloud.com](mailto:chris.vertullo@icloud.com)>  
**Cc:** Lynda Voltz [Lynda.Voltz@parliament.nsw.gov.au](mailto:Lynda.Voltz@parliament.nsw.gov.au)

Dear Chris and David

Please see below a copy of the press release detailing the ACL policy announcement made yesterday.

Kind regards  
Helen

Helen Samardzic  
Research Assistant

**Office of Lynda Voltz MLC**  
**Shadow Minister for Sport**  
**Shadow Minister for Veterans' Affairs**  
Parliament of NSW  
Macquarie St Sydney 2000



MEDIA RELEASE

**Luke Foley MP**  
NSW Opposition Leader



Sunday, 4 November 2018

## LABOR'S PLAN TO HELP PREVENT KNEE INJURIES IN YOUNG SPORTSPEOPLE

NSW Opposition Leader Luke Foley has announced Labor's program to help prevent ACL injuries in young sportspeople, which can have lifelong impacts.

Mr Foley was joined today by young athletes at Coleman Park, home of the Lidcombe Waratah FC, to announce Labor's \$2 million neuromuscular training program, aimed at reducing the incidences of ACL injuries in 12-25 year olds.

ACL (anterior cruciate ligament) injury is a serious and debilitating knee injury that is more common in high-risk sports, including netball, basketball, rugby league, rugby union, touch football, soccer, AFL and skiing. Typically the ACL ruptures when someone changes direction at speed while playing a multidirectional sport.

Australia has one of the highest rates of ACL injuries in the world with approximately 72 per cent of ruptures

Mr Foley was joined today by young athletes at Coleman Park, home of the Lidcombe Waratah FC, to announce Labor's \$2 million neuromuscular training program, aimed at reducing the incidences of ACL injuries in 12-25 year olds.

# Return to Play Following ACL Reconstruction

**Seth Sherman, MD**

Educating young athletes  
to avoid injury before their  
sports season begins.



David Lile on KFRU  
July 10, 2018



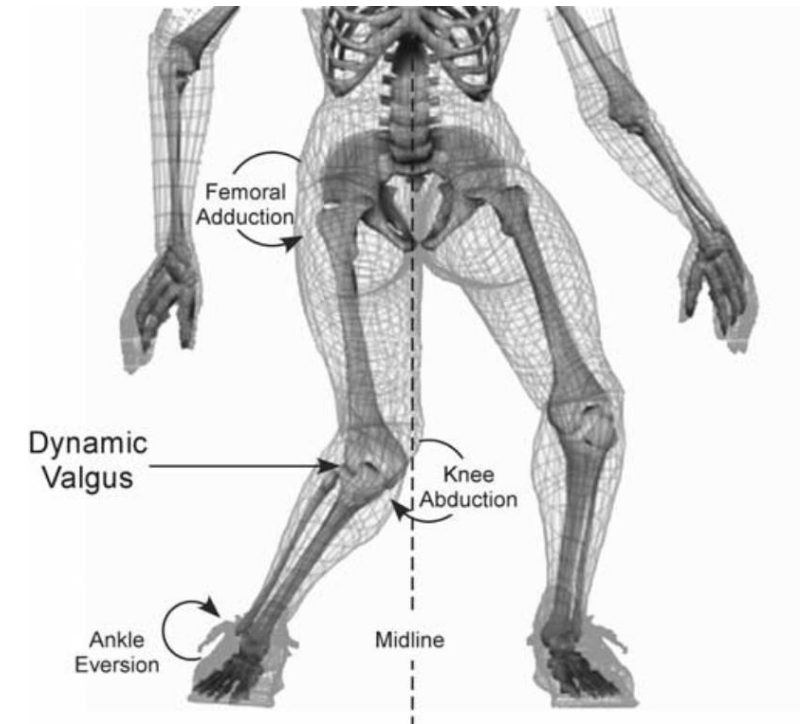
Missouri  
Orthopaedic Institute  
*University of Missouri Health Care*



Seth L. Sherman, M.D.  
Assistant Professor  
Department of Orthopedic Surgery  
University of Missouri

# Mizzou RTP Functional Evaluation

- Drop Vertical Jump Test to assess for “dynamic valgus”
- Known risk factor for non-contact ACL tear and re-tear





# Current and Future Directions

- ACL injury prevention/screening
- Validating /automating different movements and more measurements with existing movements
  - Single limb measures
  - mSEBT
- Grant funding for future work/Multicenter collaboration
  - Tim Hewett and others



## **To Screen or Not to Screen for ACL Injury Risk: That is the Question** *by Seth Sherman, MD*



Youth sport participation is on the rise, particularly among female athletes. Approximately three quarters of American households have a child who plays organized sports.<sup>1</sup> ACL injuries are of particular concern because adolescents with major knee injuries are more prone to functional deficits, poorer quality of life, and increased risk of obesity in the decade following injury.<sup>2</sup> Screening programs may help to identify youth athletes at higher risk of ACL tear. Targeted injury prevention strategies may help reduce the incidence of ACL injury.

Targeted injury prevention strategies may help reduce

# Advanced Functional Training

## Active warm-up and injury prevention

- FREE Online Programs



### FIFA 11+

**PART 1 RUNNING EXERCISES - 8 MINUTES**

- 1. RUNNING STRAIGHT AHEAD
- 2. RUNNING HIP OUT
- 3. RUNNING HIP IN
- 4. RUNNING CIRCLING PARTNER
- 5. RUNNING SHOULDER CONTACT
- 6. RUNNING QUICK FORWARDS & BACKWARDS

**PART 2 STRENGTH - PLYOMETRICS - BALANCE - 10 MINUTES**

- 7. THE BENCH STATIC
- 8. THE BENCH ALT ERNATE LEGS
- 9. THE BENCH ONE LEG LIFT AND HOLD
- 10. SEAWAYS BENCH STATIC
- 11. SEAWAYS BENCH RAISE & LOWER HIP
- 12. SEAWAYS BENCH WITHLEG LFT
- 13. HAMSTRINGS BEGINNER
- 14. HAMSTRINGS INTERMEDIATE
- 15. HAMSTRINGS ADVANCED
- 16. SINGLE-LEG STANCE HOLD THE BALL
- 17. SINGLE-LEG STANCE THROWING BALL WITH PARTNER
- 18. SINGLE-LEG STANCE TEST YOUR PARTNER
- 19. SQUATS
- 20. SQUATS
- 21. SQUATS



Get Set - Train Smarter

IOC Health & Fitness

★★★★★ 318

Everyone

You don't have any devices

Add to Wishlist

Install



**Stay on track**  
Injuries and illness are common in sports, and can be devastating for athletes.

Get Set

SPORT	BODY	LAST USED
Alpine Skiing	Archery	Artistic Gymnastics
Athletics	Badminton	Basketball
Beach Volleyball	Biathlon	Bobsleigh
Boxing	Canoeing	Cross Country Skiing

Arkle >  
Back >  
Groin >  
Hamstrings >  
Knee >  
Shoulder >

# Joseph Janosky MS, PT, ATC

Director  
HSS Sports Safety



# Sports Safety





## GOAL

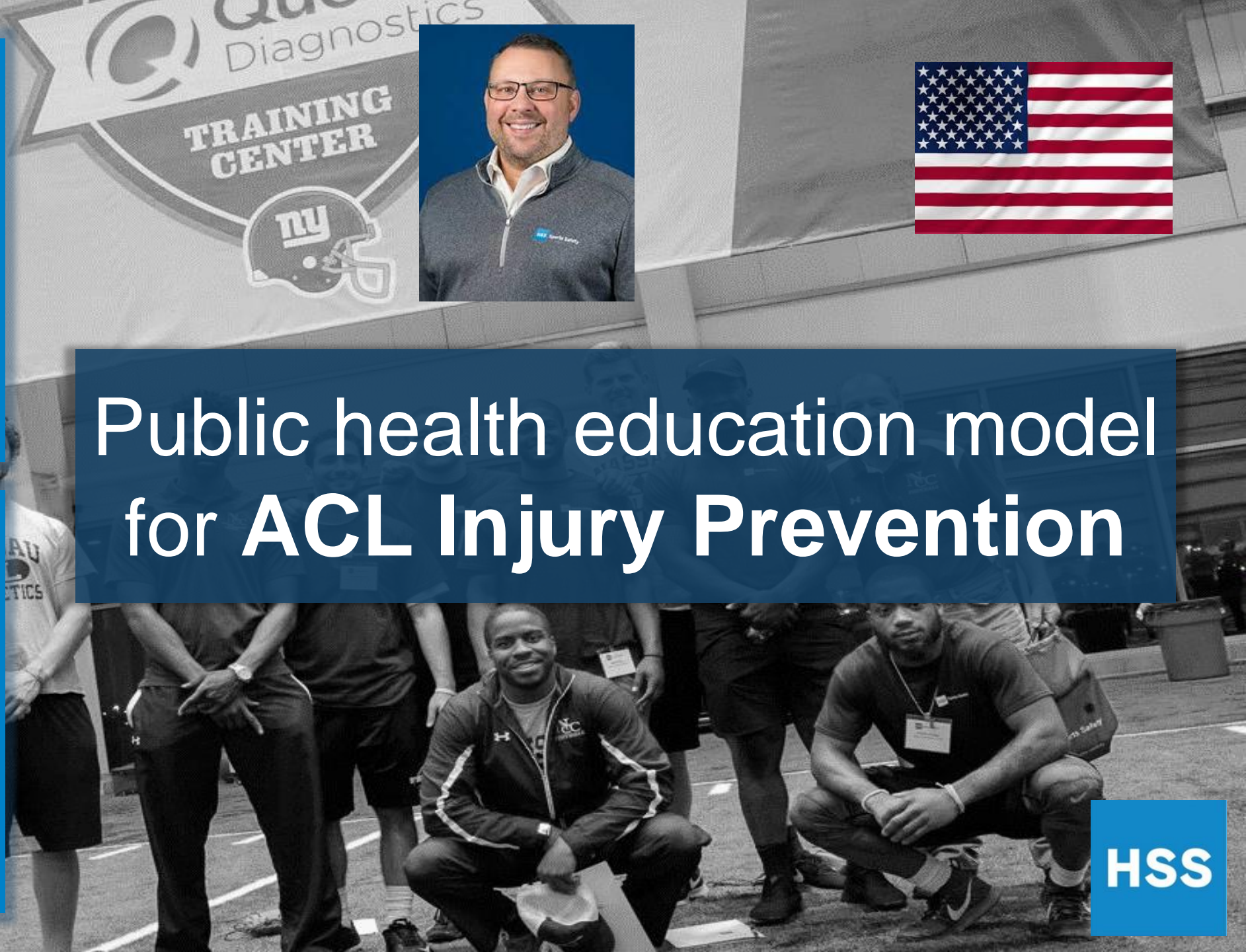
Empower all individuals responsible for the safety of young athletes to reduce the risk of sports-related ACL injury



# Public health education model for ACL Injury Prevention

## STRATEGY

Provide individualized and highly effective public health education for each target audience



HSS



Sports  
Coach

Physical Education  
Teacher

Sports  
Administrator

Sports Medicine  
Clinician

Parent

Young  
Athlete

# Public health education model for ACL Injury Prevention



 HOSPITAL FOR  
SPECIAL SURGERY

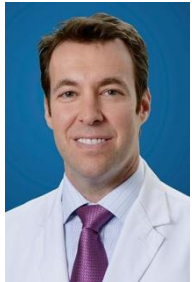
The **#1**  
Hospital for  
Orthopaedics

- U.S. News & World Report





# G.U.A.R.D.I.A.N.S. OF THE ACL ©



**JOIN(T)  
FORCES**



Joris Buijtdijk



Arjen Frudiger



Martin Baan



Danny van der Valk



Iiona Gorter





2010 start

3 years of thinking, re-  
thinking – implementing

how to approach the  
„patients“ / sporters

approach the coach?

approach the  
physiotherapist?

how to make someone  
aware of something that  
he/she doesn't feel until  
it's too late??

social media?

marketing?

[www.jforces.nl](http://www.jforces.nl)



**JOIN(T)  
FORCES**



# Injury Prevention Program

Awareness

Research and Development

Education

Data Analysis

Implementation

Quality Control

Staff Training

Software and Application

Neuromuscular Deficit Targeting



# GOED

# FOUT



Datum: 07-06-2016  
Gewicht: 59.00 kilogram

### Patiëntgegevens

Geboortedatum: 25-06-2001  
Sport: Hockey  
Vereniging: Leonidas

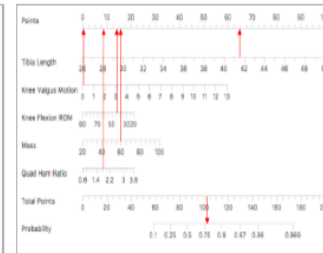
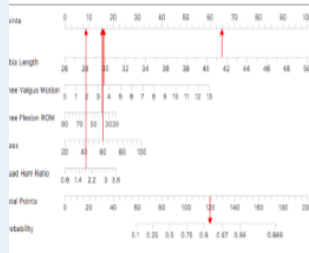
Status: Preventie  
Aangedane zijde:  
Diagnose

### Testresultaten links

Tibia length: 41.50  
Knee Valgus Motion: 3.43  
Knee Flexion ROM: 40.00  
Quad Ham Ratio: 1.80  
Total points: 119.41  
Probability: 0.93

### Testresultaten rechts

Tibia length: 41.50  
Knee Valgus Motion: 0.00  
Knee Flexion ROM: 44.00  
Quad Ham Ratio: 1.79  
Total points: 102.31  
Probability: 0.78



Datum: 08-09-2016  
Gewicht: 47.60 kilogram

### Patiëntgegevens

Geboortedatum: 28-09-2003  
Sport: Hockey  
Vereniging:

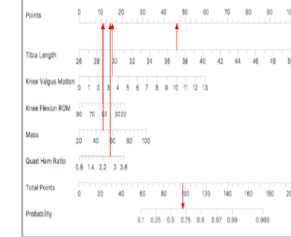
Status: Preventie  
Aangedane zijde:  
Diagnose

### Testresultaten links

Tibia length: 37.00  
Knee Valgus Motion: 3.34  
Knee Flexion ROM: 54.00  
Quad Ham Ratio: 2.64  
Total points: 97.37  
Probability: 0.70

### Testresultaten rechts

Tibia length: 36.00  
Knee Valgus Motion: 3.44  
Knee Flexion ROM: 38.00  
Quad Ham Ratio: 2.09  
Total points: 94.62  
Probability: 0.65



Before



After







app



**Kaart Join(t)Forces**

Deze clubs, verenigingen, praktijken gebruiken Join(t)Forces  
5.894 Ansichten

**TEILEN**

- clubs, verenigingen en scholen**
  - Hockey vereniging Leonidas
  - Hockey vereniging Ringpass
  - Hockey vereniging Victoria
  - Hockey vereniging Hudito
  - ... 79 weitere
- test- en instructie centra**
  - Fysioplein
  - Somatic Amerongen, fysiotherapiepraktijk
  - Somatic Doorn, fysiotherapiepraktijk
  - Somatic Cothen, fysiotherapiepraktijk
  - ... 96 weitere
- Spomed hoofdvestiging**
  - Spomed



adolescents aged 11-23 years of age



84 sport clubs / 100 PT offices

field tests done by instructed PT, children with abnormal tests go to specially trained PT centers for additional testing (nomogram)

2017: 455 tests were done, all in trained PT centers

2017: 112 tests SPOMED (home of join[t]forces)





Neuromuscular trainings program by warm up

3 different age groups / 3 different levels

Nomogram for probability of high knee load

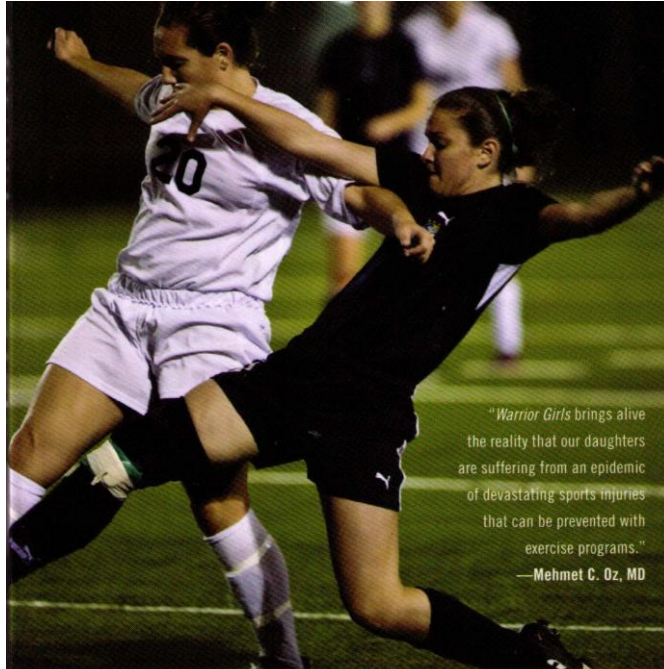
Software for data collection

web based app with testcyclus and data

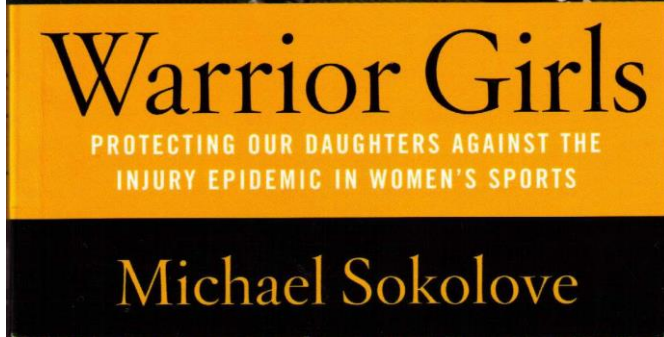
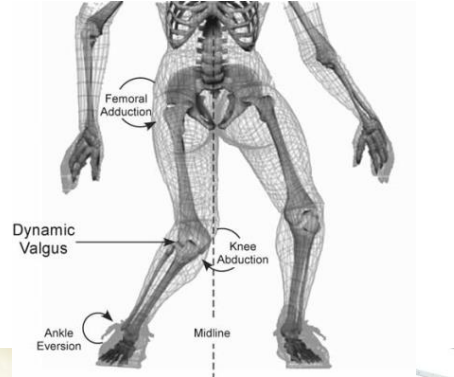
Neuromuscular deficit targeting



# acl prevention



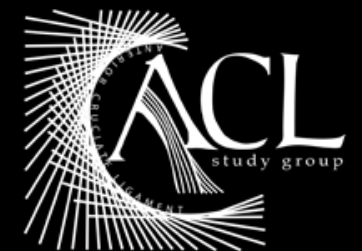
"Warrior Girls brings alive the reality that our daughters are suffering from an epidemic of devastating sports injuries that can be prevented with exercise programs."  
—Mehmet C. Oz, MD





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founder join(t)forces  
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Prevention committee GOTS  
Ambassador ACL prevention ESMA  
GUARDIANS of the ACL (acl study group)



THE ANTERIOR CRUCIATE LIGAMENT STUDY GROUP

Dedicated to the Understanding, Teaching & Research of the Knee