

mb Injury prevention programs/exercises
An evidence-based update
with focus on football

schulthess clinic
SPORTASIO

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ITALIA CONI
SCUOLA DELLO SPORT
MARCHE
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Overview

- Contact injuries/
Laws of the Game
- Non-contact injuries
- Injury prevention
- Exercises/programs
 - Children
 - Professionals
- Implementation challenges

Injuries
sport dependency

Sport	All injuries (per 1000 matches)	Time-loss injuries (per 1000 matches)
Football	~45	~110
Handball	~38	~115
Basketball	~28	~65
Field hockey	~15	~38
Baseball	~12	~28
Soccer	~5	~2
Water polo	~5	~20
Volleyball	~5	~8

Fig. 2.5.2.1 Number of injuries per 1000 player matches

Study of Olympic Games 2004, Junge et al (BJSM)

Football injuries
incidence and severity

Injury Type	Incidence (No. of injuries / 1000 player hours)	Severity (log No. of days lost)
ACL Tear	~0.2	~150
Tibia / Fibula fracture	~0.2	~120
Knee cartilage lesion	~0.3	~50
Achilles tendon injury / tendinopathy	~0.3	~25
Crossligament	~0.3	~15
Laceration	~0.3	~10
Low back pain	~0.3	~8
MCL tear	~0.4	~25
Quadriceps muscle injury	~0.4	~15
Cell muscle injury	~0.4	~10
Low back pain	~0.4	~8
Hamstring muscle injury	~0.6	~25
Abolic strain	~0.6	~15
Grain muscle injury	~0.6	~10
Lower leg contusion	~0.8	~8

References by R. Bahr, B. Clarsen & J. Ekstrand BJSM 2017
Designed by eH.M.SportScience

Data collected in professional football at the UEFA Champions League level

Acute injuries contact vs non-contact



Elbowing (trauma)
CONTACT



Acute hamstring muscle strain
NON-CONTACT

Prevention of contact injuries (example)

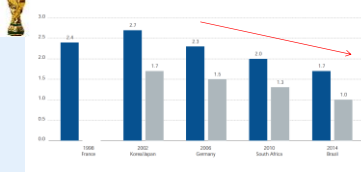


New rules, IFAB approved, first implemented at the World Cup 2006 in Germany, following F-MARC research and FIFA Medical ExCo actions

Prevention of contact injuries - male pro-players only -



FIFA World Cup: average nr. injuries per match (Dvorak et al. BJSM 2015)



Lower incidence of arm-to-head contact incidents with stricter interpretation of the Laws of the Game in Norwegian male professional football
John Sperbone, Rolf Bak, Siri Dvorak, Thor Einar Andersen



Prevention of non-contact injuries Literature - mostly in amateur players -



„Good“ evidence that prevention programs can reduce non-contact injuries in sports (mostly in football)

- Injuries in general > *multimodal programs*
- Ankle sprains > *orthosis, proprioceptive training*
- ACL, knee injuries > *neuromuscular/plyometric training*
- Hamstring strains > *eccentric training*



Ekstrand 1983, Heidt 2000, Junge 2002, Tropp 1985, Surve 1994, Södermann 2000, Caraffa 1996, Hewett 1999, Askling 2003, Mandelbaum 2005, Amason 2007, Gilchrist 2008, Soligard 2008, Soligard 2009, Emery 2010, Kiani 2010, LaBella 2010, Petersen 2011, Junge 2011, Beijersterveldt 2011, Walden 2012, Bizzini 2013, Steffen 2013-I, Steffen 2013-II, Silvers 2014, Owosoye 2014, Silvers 2015, ...

Neuromuscular (warm-up) programs for injury prevention (2005-2015)

YEAR	AUTHORS	Design	Nr subj/gender/yr	Sports
2005	Olson	RCT	958/male, female/15-17	Handball
2005	Mandelbaum	CCT	1041 / female / 14-18	Soccer (PEP)
2006	Pfeiffer	CCT	1439 / female / 14-18	Soccer, basket, volleyball
2008	Gilchrist	RCT	1435 / female / av.19	Soccer (PEP)
2008	Steffen	RCT	2020 / female / 13-17	Soccer (11+)
2008	Saigard	RCT	1982 / female / 13-17	Soccer (11+)
2010	Kiani	RCT	1506 / female / 13-19	Soccer (rehabilitative)
2010	Emery	RCT	744/male, female/13-18	Soccer (y)
2007	Emery	RCT	920/male/female/12-18	Basketball
2008	Pasanen	RCT	457 / female / av. 24	Floorball
2011	LaBella	RCT	1558 / female / av.16	Basketball, soccer
2012	Longo	RCT	121 / male / 13-15	Basketball (11+)
2012	Bejsterveldt	RCT	456 / male / 18-40	Soccer (11)
2012	Walden	RCT	4564 / female / 12-17	Soccer (rehabilitative)
2015	Silvers et al	RCT	1769 / male / 18-23	Soccer (11+)
2014	Owings et al	RCT	414 / male / 14-19	Soccer (11+)

- 16 key papers
- 14 RCTs
- 12 on soccer
- 9 with female athletes
- 13 with significant reduction of overall injuries (incl. knee, ACL injuries)

Injury prevention – evidence

Age, gender and level of play

PROFESSIONAL (with question mark icon)

- SERIE A
- SERIE B
- Serie C - Prima divisione
- Serie C - Seconda divisione
- Serie D - Lega Nazionale Dilettanti Eccellenza

SEMI-PROFESSIONAL (with green checkmark icon)

- Promozione
- Prima Categoria
- Seconda Categoria
- Terza Categoria

AMATEUR (with green checkmark icon)

Age range 13-25 yrs (with green checkmark icon)

Injury prevention – evidence

11+ - most studied program

11+

SYSTEMATIC REVIEW AND META-ANALYSIS INCLUDING 6 RANDOMISED CONTROLLED TRIALS COMPARING THE FIFA 11+ INJURY PREVENTION PROGRAMMES WITH A CONTROL AND ON SAME INTERVENTIONS PROLONG 8074 INDIVIDUALS PLAYING FOOTBALL AT THE RECREATIONAL/ORGANISE LEVEL, EXPOSED TO 510,305 HOURS OF FOOTBALL ACTIVITY AND ENDURING 2454 INJURIES IN TOTAL.

PLAY IT SAFE WITH FIFA 11+

- 44% REDUCTION (KNEE)
- 32% REDUCTION (ANKLE)
- 41% REDUCTION (HIP & GROIN)
- 60% REDUCTION (HAMSTRINGS)

THE FIFA 11+ PREVENTION PROGRAMME REDUCES THE TOP FOUR MOST PREVALENT FOOTBALL INJURIES

Thorborg et al. BJSM 2017

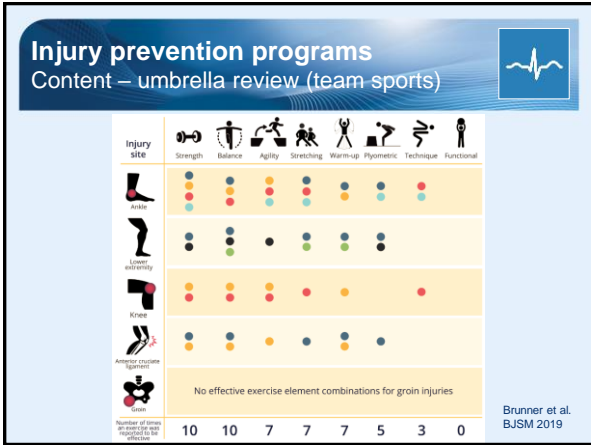
Injury prevention programs

Content

Key elements of these programs:
(content mainly comes from rehab)

- Neuromuscular control
- Body awareness
- Balance
- Core strength/stability
- Hamstring
- Landing, cutting techniques
- Plyometrics

Hewett NAJSPT 2010



Update paper BJSM 2018

Review

Strength training as superior, dose-dependent and safe prevention of acute and overuse sports injuries: a systematic review, qualitative analysis and meta-analysis

Jeppe Bo Laursen,^{1,2} Thor Einar Andersen,³ Lars Bo Andersen^{1,4}

What is already known?

- ▶ Strength training programmes to prevent acute and overuse sports injury are effective.
- ▶ Neuromuscular training and multicomponent programme studies are effective, but to a lesser degree than strength training programmes.
- ▶ The number of studies exclusively analysing strength training interventions is increasing.

Specific preventive exercises Nordic Hamstring

Week	Repetitions Per Week	Time and Repetitions
1	4	2 × 4
2	4	2 × 4
3	4	2 × 4
4	4	2 × 4
5	4	2 sets, 12-16 of range
6-8	4	2 sets, 12-16 of range

Notes and hands in the feet, let the feet touch the ground, and immediately get back to the starting position by pulling with their hands to maintain tension in the muscle in phase 1. The exercise was conducted during regular training sessions and players were encouraged to their ability.

van der Horst et al, AJSM 2015

- Most recent RCT
- Male amateur players
- Significant reduction of hamstring injury incidence

Nick van der Horst, Dirk-Wouter Smits, Jesper Petersen, Edwin A. Goethart, and Frank J.G. Backx

The Preventive Effect of the Nordic Hamstring Exercise on Hamstring Injuries in Amateur Soccer Players: A Randomized Controlled Trial

Am J Sports Med March 20, 2015; published online before print March 20, 2015; doi:10.1177/0363546515574057

Specific preventive programs Groin-I

- Hölmich et al. Scand J Med Sci Sport 2010
- RCT
- 977 male players
- Intervention: exercises (hip add, trunk, stab/strength)
- Results: 30% reduction (although NS) of groin injuries

Esteve et al. Br J Sports Med 2014

- Systematic review
- Lack of evidence!
- Estimate reduction 19-52% in football players (clinical relevance !)
- Efficacy unknown (compliance unreported)

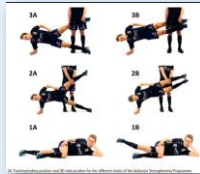
Specific preventive programs Groin-II



The Adductor Strengthening Programme prevents groin problems among male football players: a cluster-randomised controlled trial

Sjur Haug¹, Benjamin Clares¹, Espen Gulabali Wigset¹, Mari Elisabeth Øien¹, Andreas Serre^{1,2}, Kristian Thorborg², Per Wilhoj², Tor Erik Andersen¹, Roald Bahr¹

- 35 semi-pro teams (652 football players)
- Cluster RCT
- Intervention group: hip adductor strengthening program (single exercises, 3 progression levels)
- Results: reduction of prevalence and risk of groin problems in male players by 41%



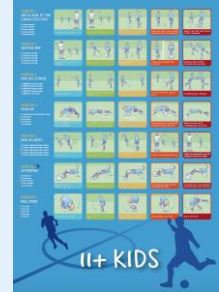
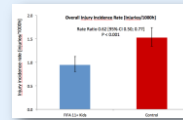
What about children?

=> 11+ KIDS

Rössler et al. Sports Med 2017



- Large cluster RCT (2015)
- 4 countries (CH, D, CZ, NL)
- ~4'000 children (9-12 yo)
- 11+ KIDS
- ~50% reduction of injuries



What about professional football?



- Epidemiological data: many studies! (UEFA CL)
- Prevention studies: (almost) no data!
- Difficulties/barriers: pressure, congested calendar, training myths & beliefs, ...



Bahr et al. BJSM 2015

- UEFA CL & Norway clubs survey
- 150 teams adopting/performing „Nordics“:
- Results: 83% of all teams NON compliant, 6% partly compliant, 11% fully compliant

Original article
Evidence-based hamstring injury prevention is not adopted by the majority of Champions League or Norwegian Premier League football teams: the Nordic hamstring survey
Roald Bahr^{1,2}, Sjur Haug¹, Benjamin Clares¹, Jan Ekstrand¹

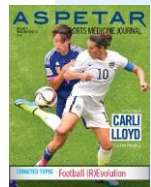


FOOTBALL MEDICINE EVOLUTION

IMPLEMENTING INJURY PREVENTION

THE ROCKY ROAD FROM RCT TO REAL-WORLD INJURY REDUCTION

- Written by James O'Brien, Austria; Martin Häggblad, Sweden and Mario Bizzi, Switzerland



www.aspetar.com/journal (June 2018)

Take home messages

- most data in amateur football -



Contact injuries

- Strict refereeing (laws of the Game; pro football)



Non-contact injuries ↓ up to 50%

- Adolescent, youth (female > male)
- Children (9-12 yo) - missing –
- Neuromuscular based programs (11+, PEP; KK)
- Specific exercises (hamstrings, adductors)
- Implementation challenges!



Grazie per la vostra attenzione !



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<https://fit4football.co.nz>



Get Set - Train Smarter
International Olympic Committee
★★★★★ (10, 2 Stars)
Free