Injury prevention in team sport: the role of strength and conditioning training

Focus on load monitoring

Ana Carolina Paludo

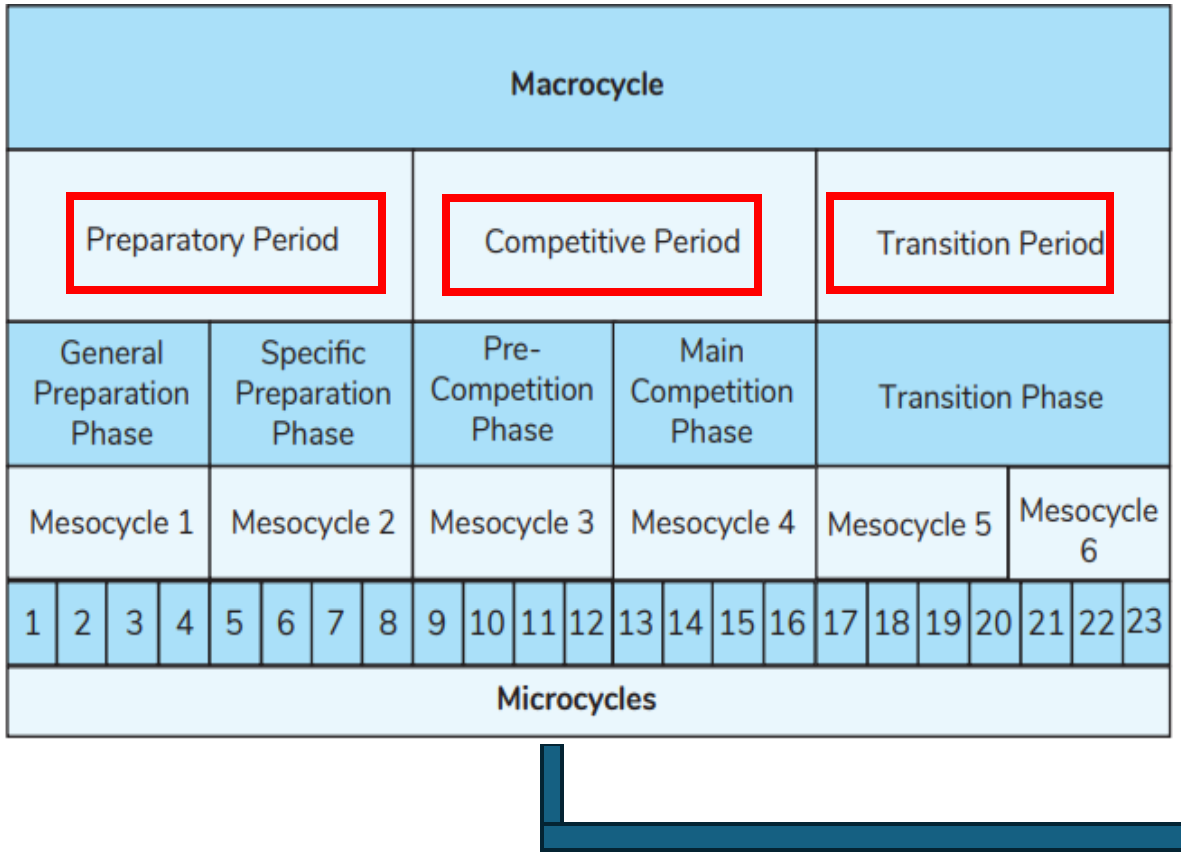
Training Plan - Periodization

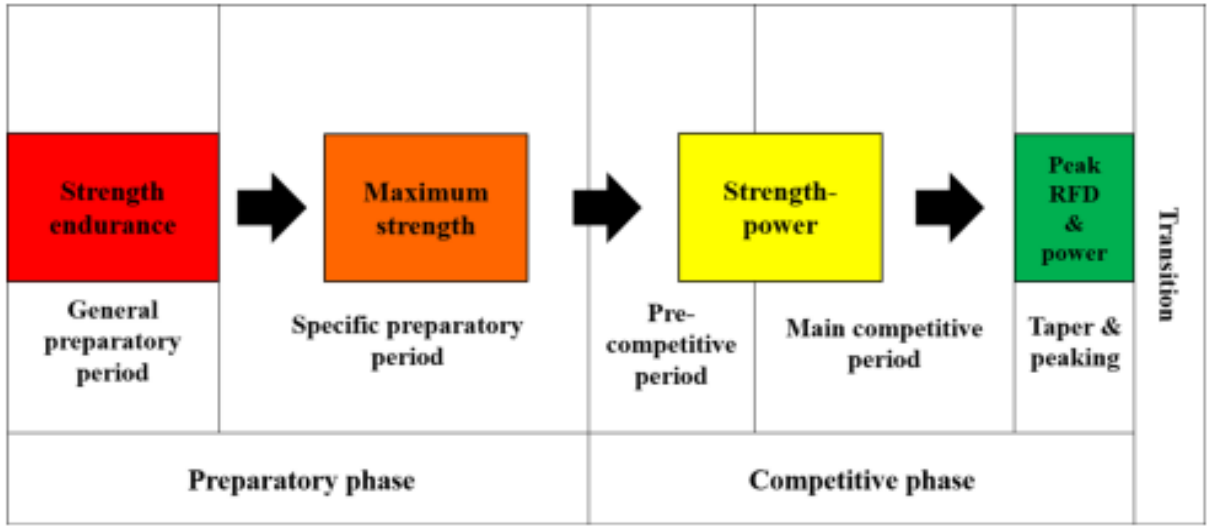
Prepare the team to reach the peak performance

on the target competition

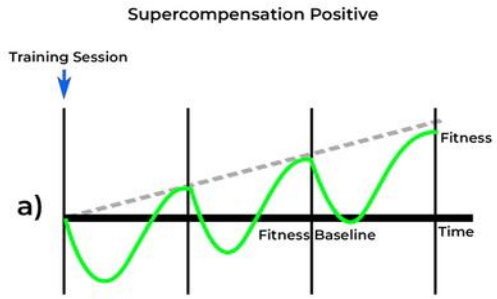
anacpaludo@gmail.com

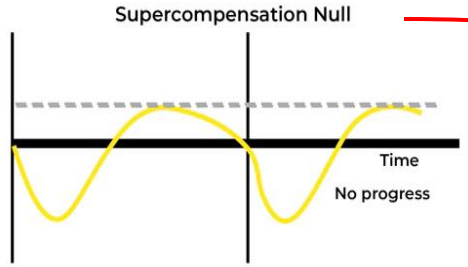
Periodization Phases

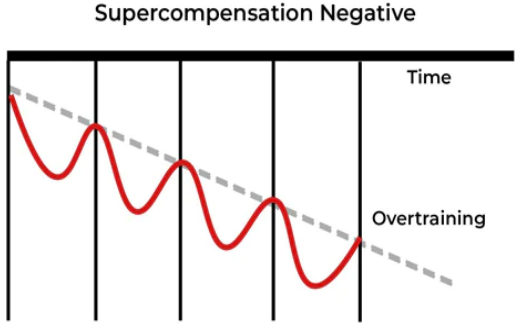




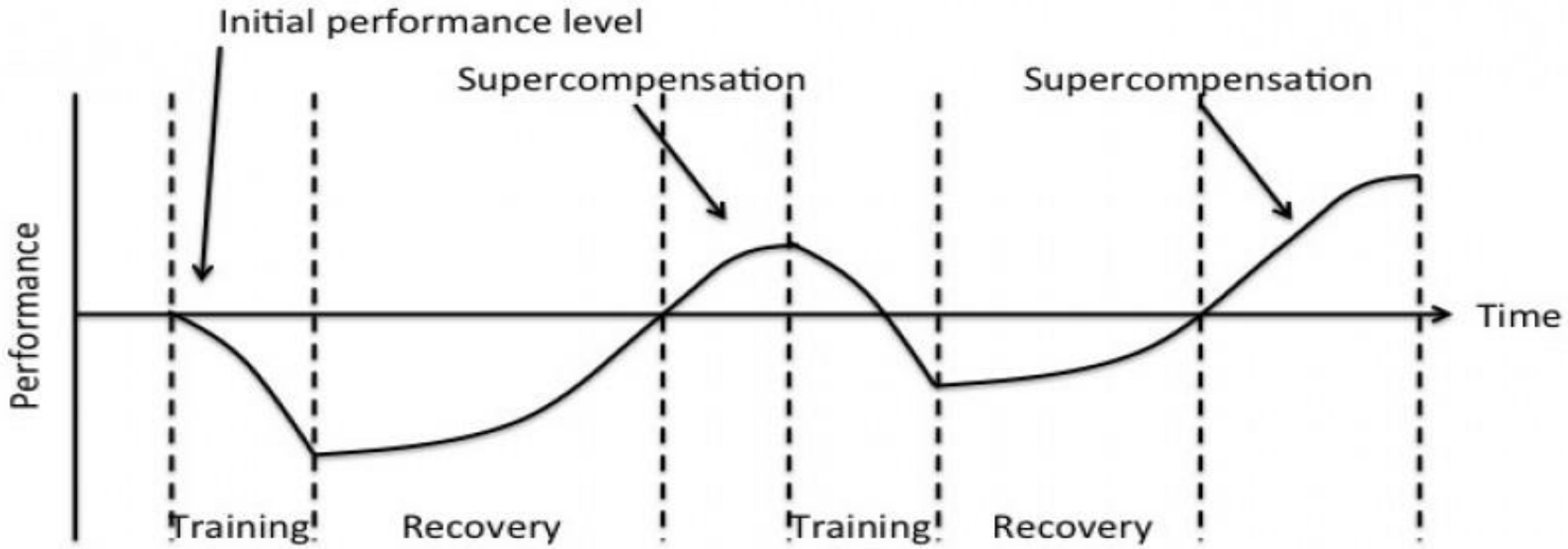
Supercompensation: training dose- response



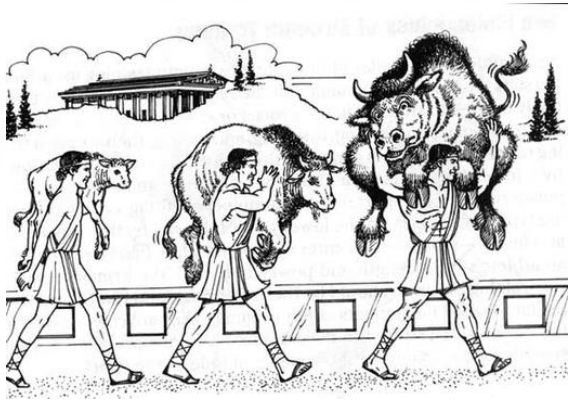




Risk of injury

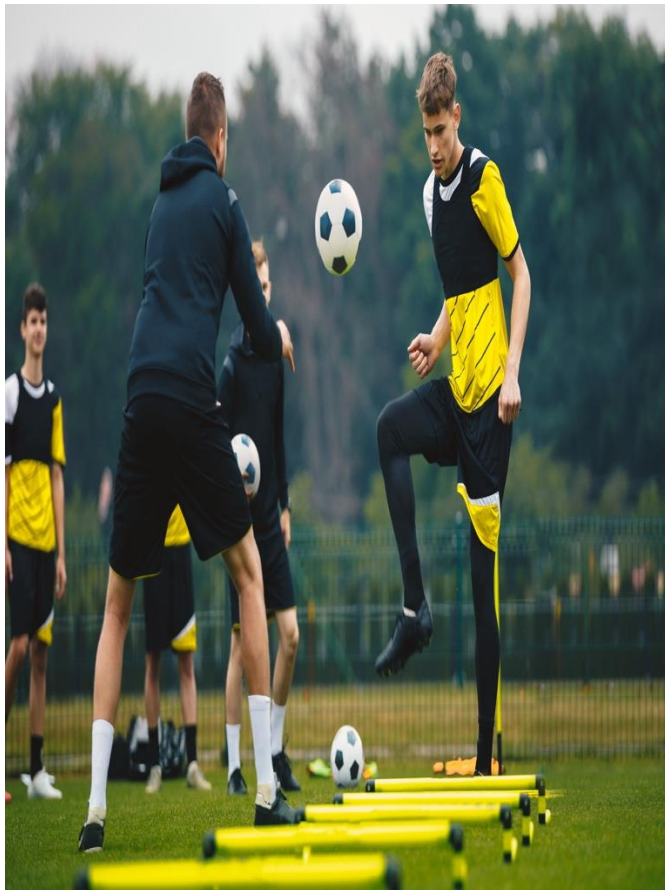


Classic periodization model: A training load followed by recovery results in increased performance (supercompensation).



How to verify the training progress?

External Load (imposed)



Metrics:

- GPS
- Training (duration, frequency…)

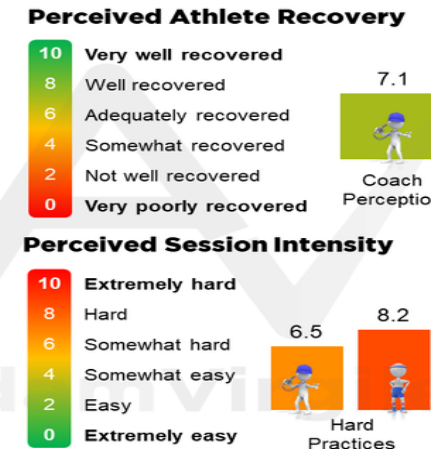
Internal Load (received/perceived)

Physiological parameters:

- Heart rate, lactate, hormones…

Perceptions:

- Recovery, session intensity (RPE), muscle pain…



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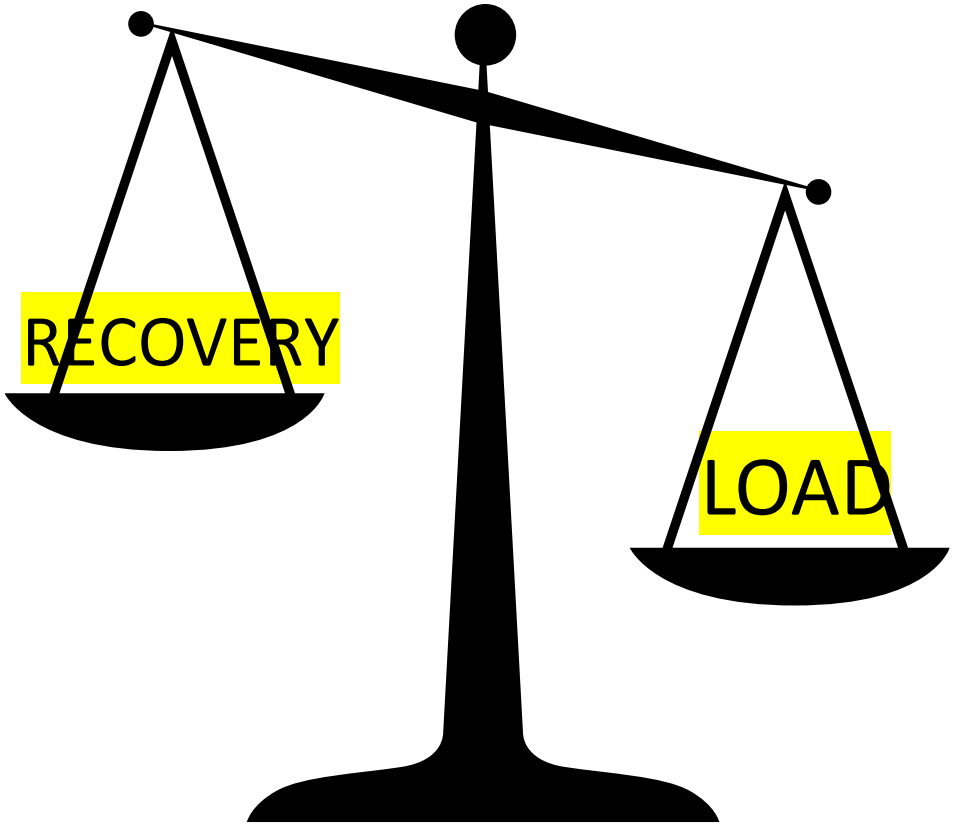
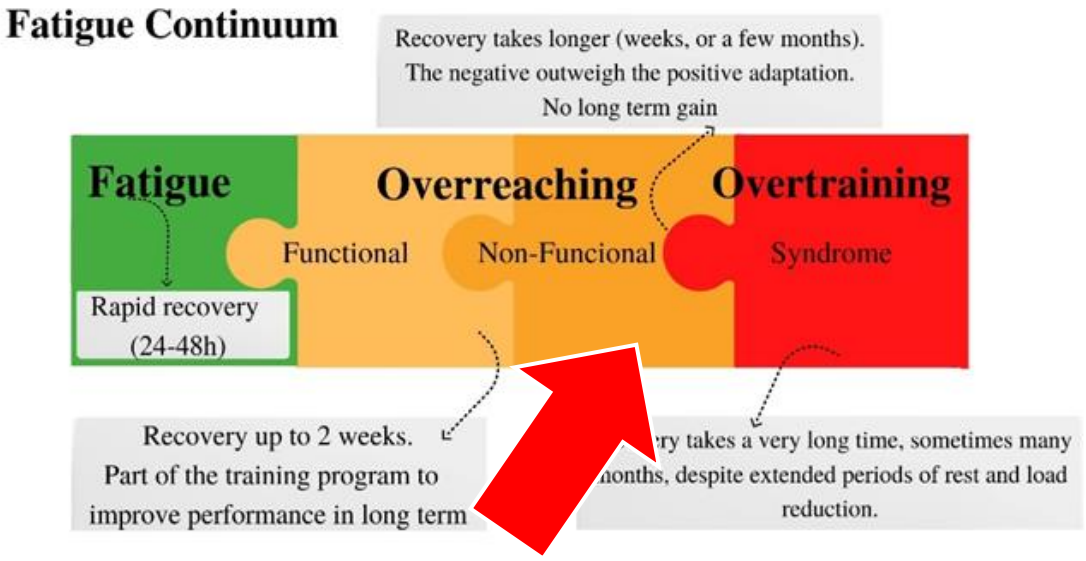
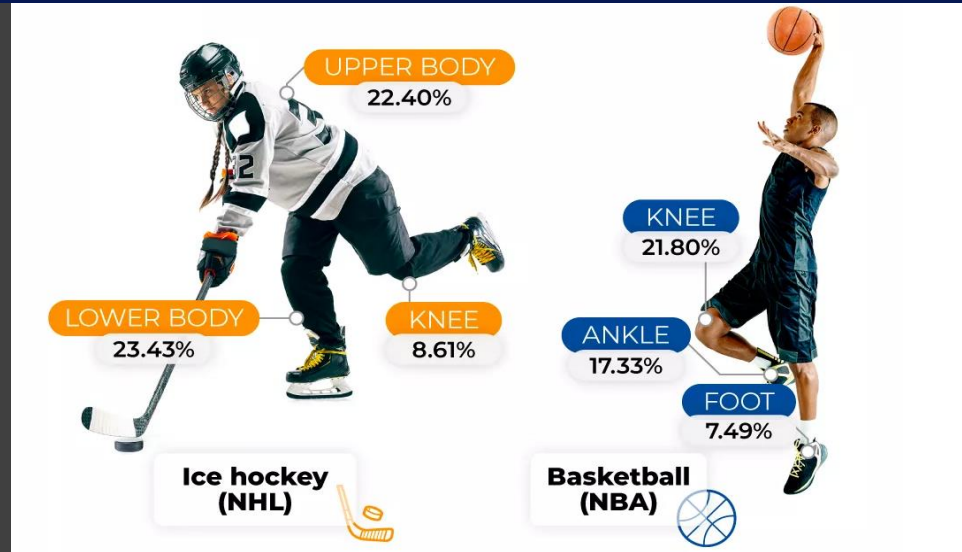
Training dose-response





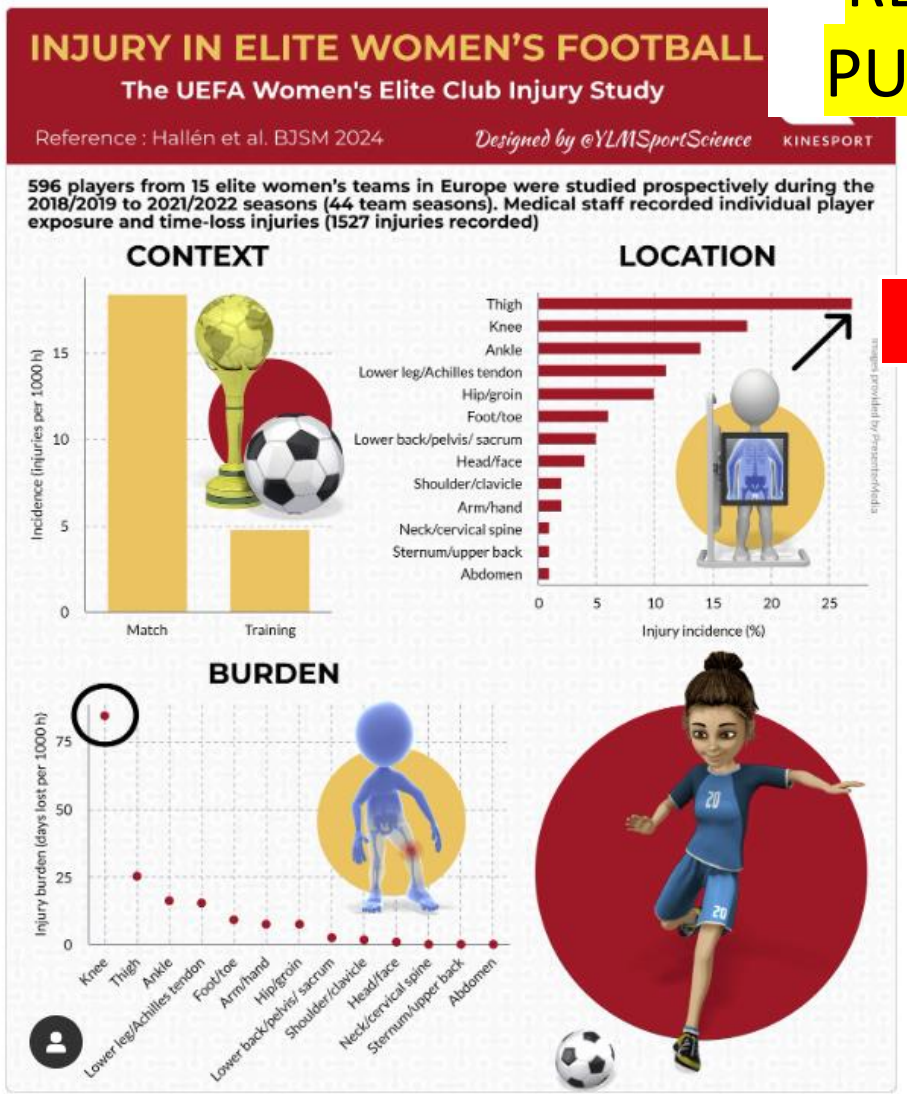
Injury investigation in team-sports

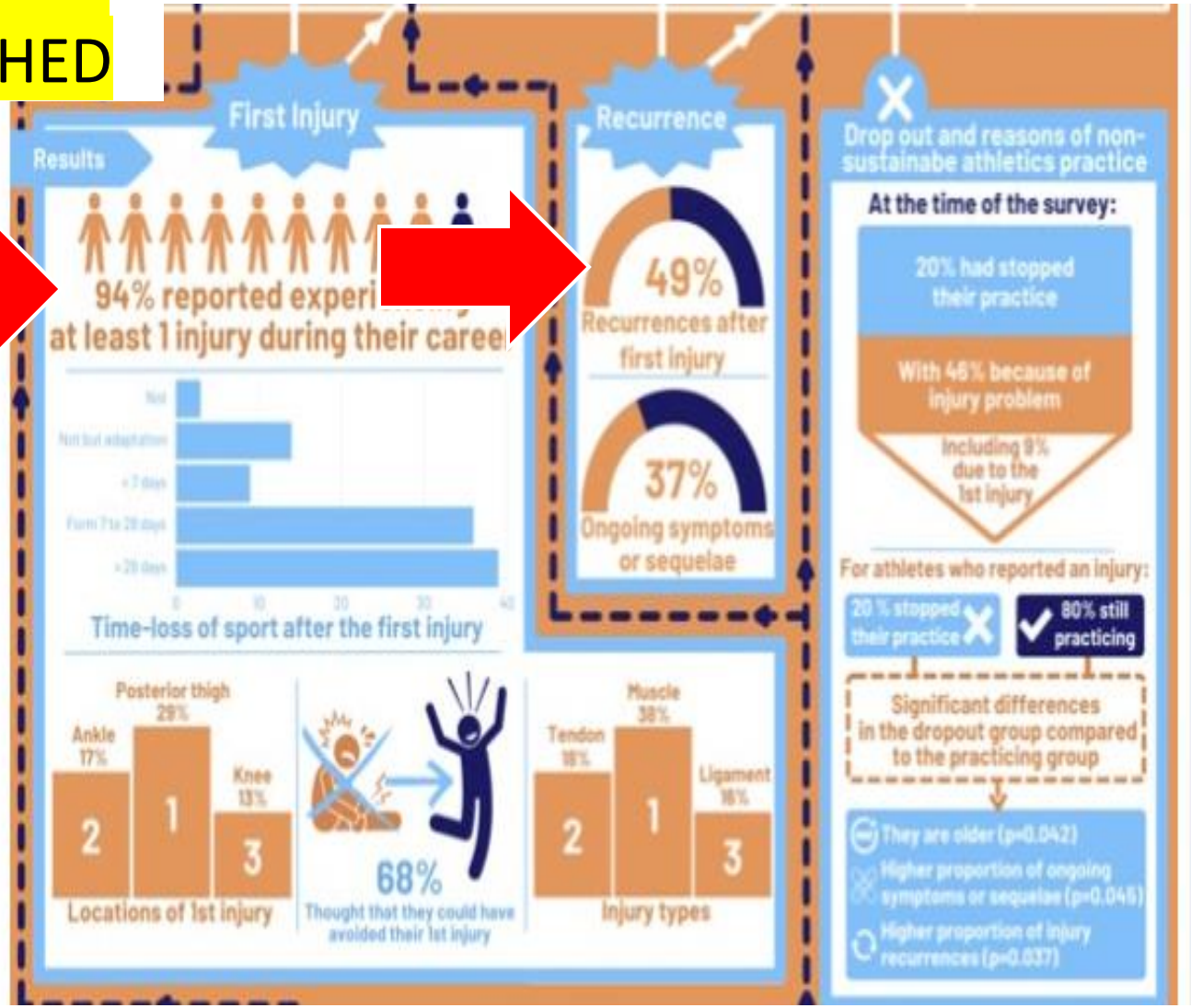


Methodology: Claims.co.uk investigated athlete injury data from reputable sports websites as well as fantasy league injury trackers, and were able to reveal the most common physical injuries in different sports.

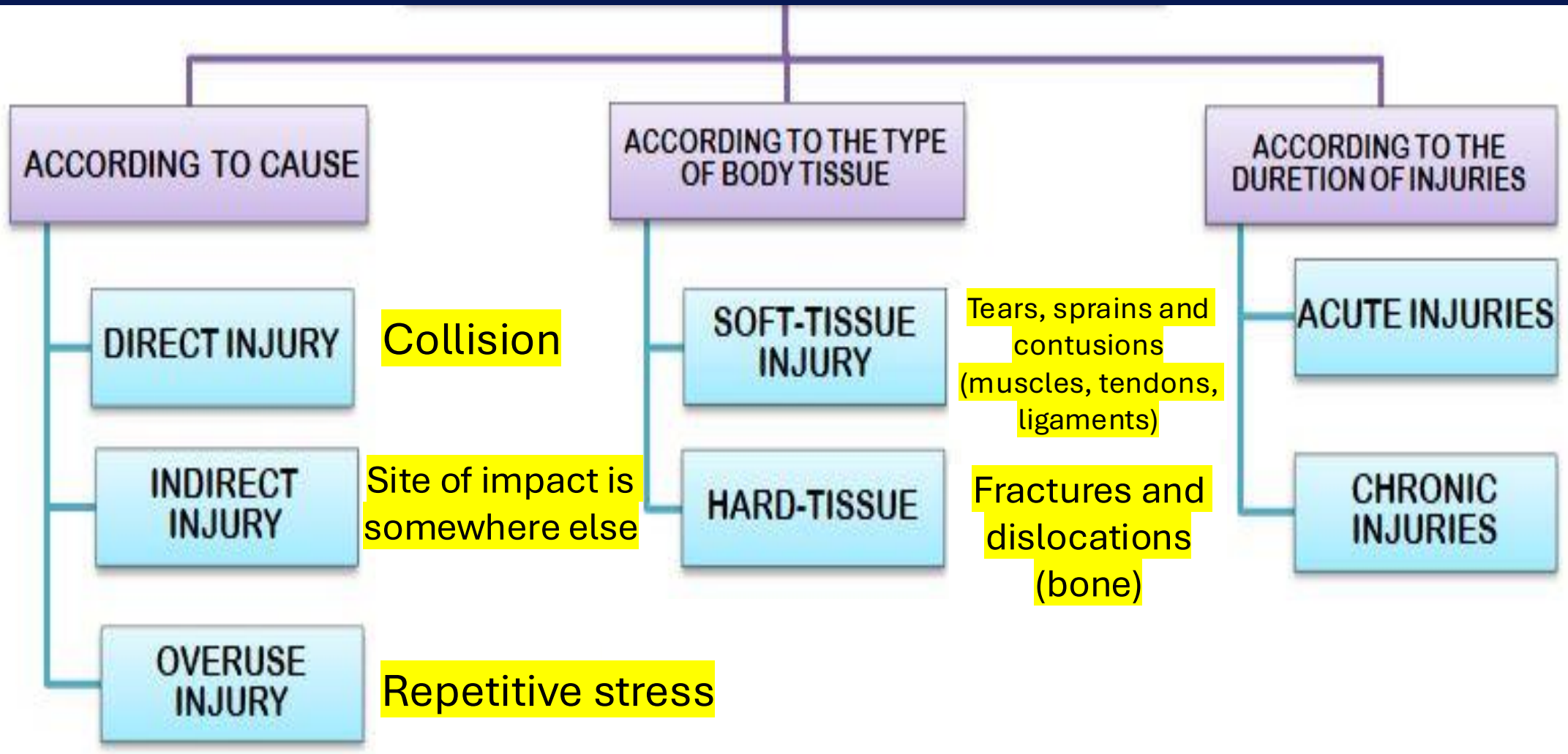
Injury investigation in team-sports

RECENTLY PUBLISHED



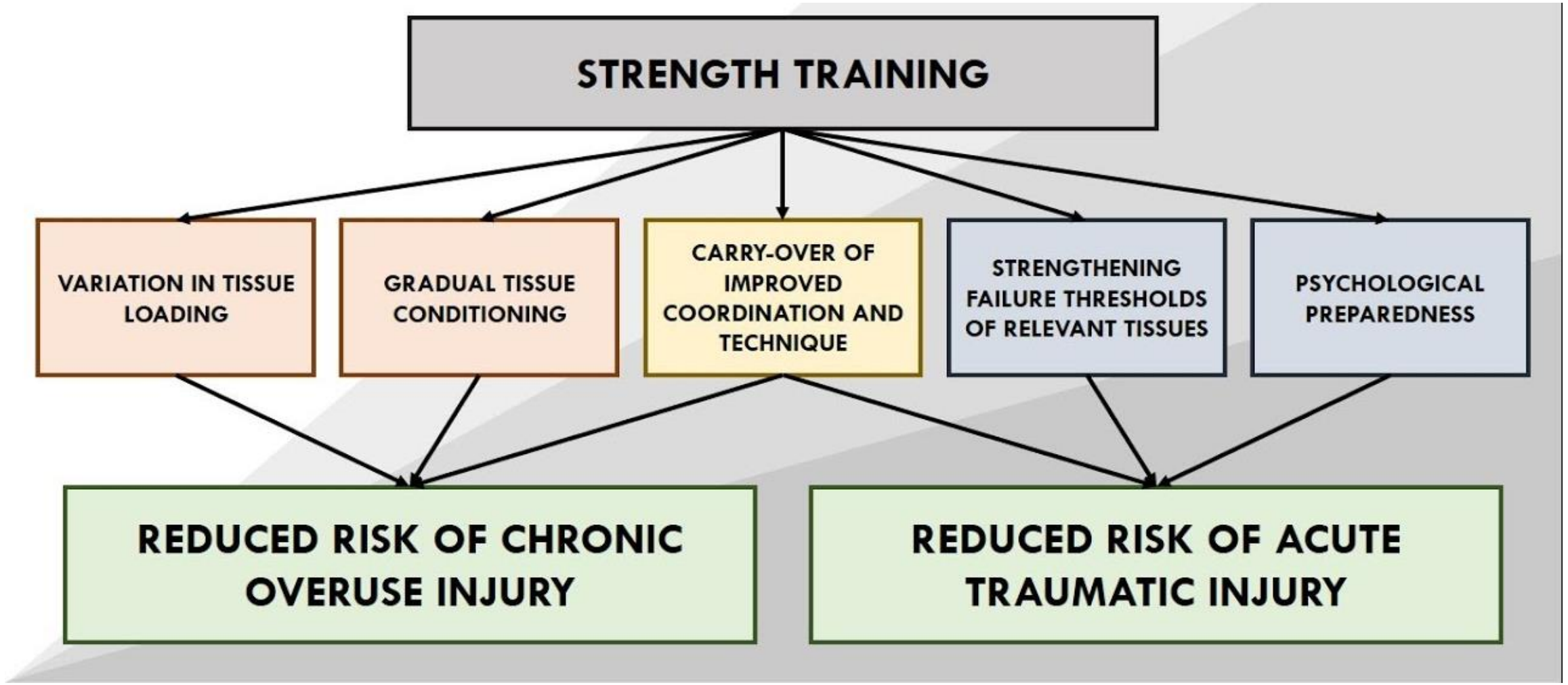


Type of sport injuries



Indirect injury refers to harm or damage that occurs as a result of an event or action but is not directly caused by that event or action itself.
Direct injury refers to harm or damage that occurs immediately as a result of a specific event or action

Importance of Strength Training



Lauersen et al. (2018). Strength Training as a Superior, Dose-Dependent and Safe Prevention of Acute and Overuse Sports Injuries: A Systematic Review, Qualitative Analysis and Meta-Analysis. *Br J Sports Med*, *52*(24), 1557-1563.

How to prepare a plan to prevent injury ?

Sports Injury Prevention is Complex: We Need to Invest in Better Processes, Not Singular Solutions

Jason C. Tee[1,2] · Shaun J. McLaren[2,3] · Ben Jones[2,3,4,5,6,7,8]

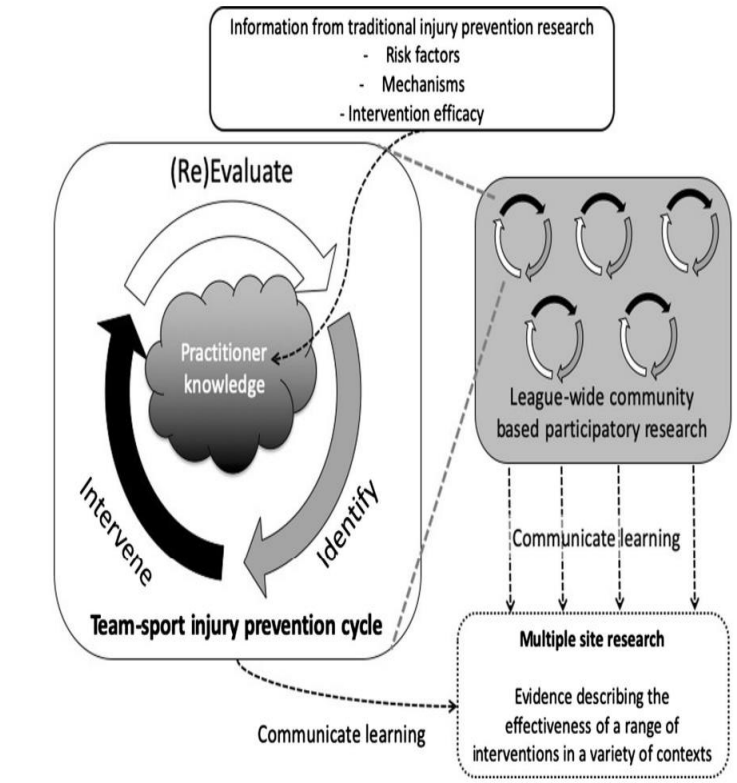
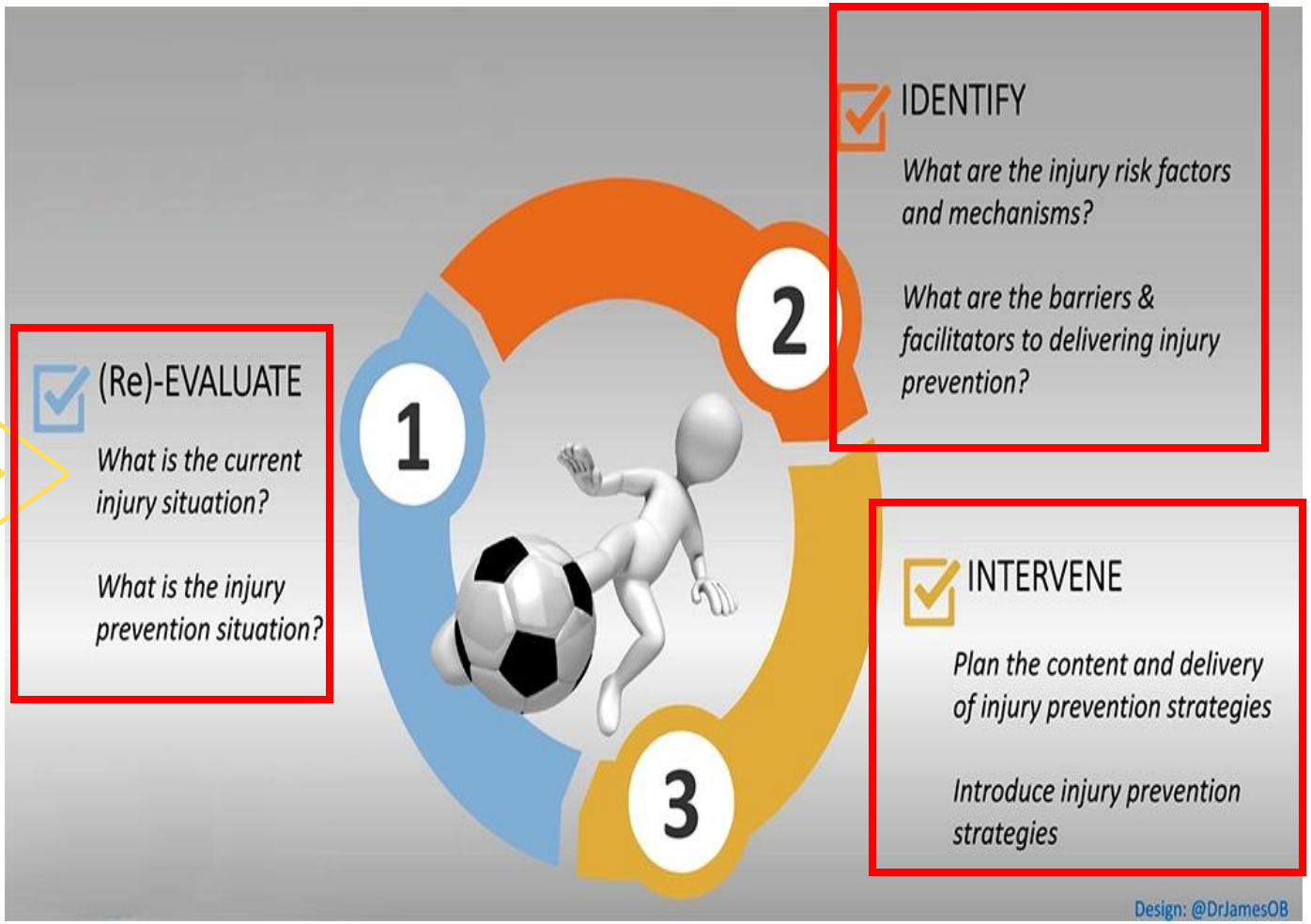


Fig. 2 Utilising the team-sport injury prevention cycle as a feedback loop to inform the continuous development of injury prevention interventions in context



How to prepare a plan to prevent injury ?

1. Athlete injury status
2. Intervention programs – injury prevention
3. Load monitoring- training and recovery

Athlete injury retrospective

Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries

C. W. Fuller[1], J. Ekstrand[2], A. Junge[3], T. E. Andersen[4], R. Bahr[4], J. Dvorak[3], M. Hägglund[2], P. McCrory[5], W. H. Meeuwisse[6]

severity

1A Date of injury: . . . . . **1B Date of return to full participation:** . . . . . .

2A Injured body part

- ☐ head/face
- ☐ neck/cervical spine
- ☐ sternum/ribs/upper back
- ☐ abdomen
- ☐ low back/sacrum/pelvis
- ☐ shoulder/clavicula
- ☐ upper arm
- ☐ elbow
- ☐ forearm
- ☐ wrist
- ☐ hand/finger/thumb
- ☐ hip/groin
- ☐ thigh
- ☐ knee
- ☐ lower leg/Achilles tendon
- ☐ ankle
- ☐ foot/toe

2B Side of body

- ☐ right
- ☐ left
- ☐ not applicable

3. Type of injury

- ☐ concussion (with or without haematoma/contusion/loss of consciousness)
- ☐ fracture
- ☐ other bone injury
- ☐ dislocation/subluxation
- ☐ sprain/ligament injury
- ☐ other injury (please specify):. . .
- ☐ lesion of meniscus or cartilage
- ☐ muscle rupture/strain/tear/cramps
- ☐ tendon injury/rupture/tendinosis/bursitis
- ☐ bruise
- ☐ abrasion
- ☐ laceration
- ☐ nerve injury
- ☐ dental injury

type

4. Diagnosis (text or Orchard code):

. . . . . .

5. Has the player had a **previous injury** of the same type at the same site (i.e. this injury is a recurrence)?

- ☐ no
- ☐ yes

If **YES**, specify date of player's return to full participation from the previous injury:. . .

6. Was the injury caused by **overuse** or **trauma**?

- ☐ overuse
- ☐ trauma

recurrence

7. When did the injury occur?

- ☐ training
- ☐ match

8. Was the injury caused by **contact or collision**?

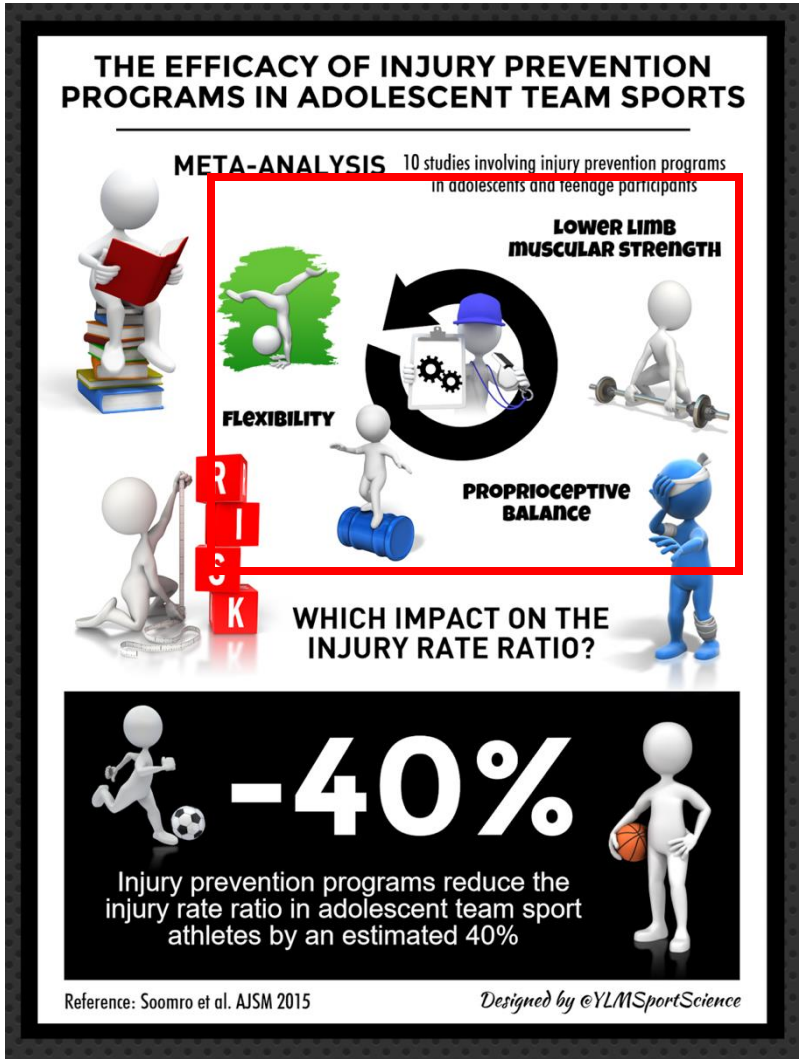
- ☐ no
- ☐ yes, with another player
- ☐ yes, with the ball
- ☐ yes, with other object (specify) . . .

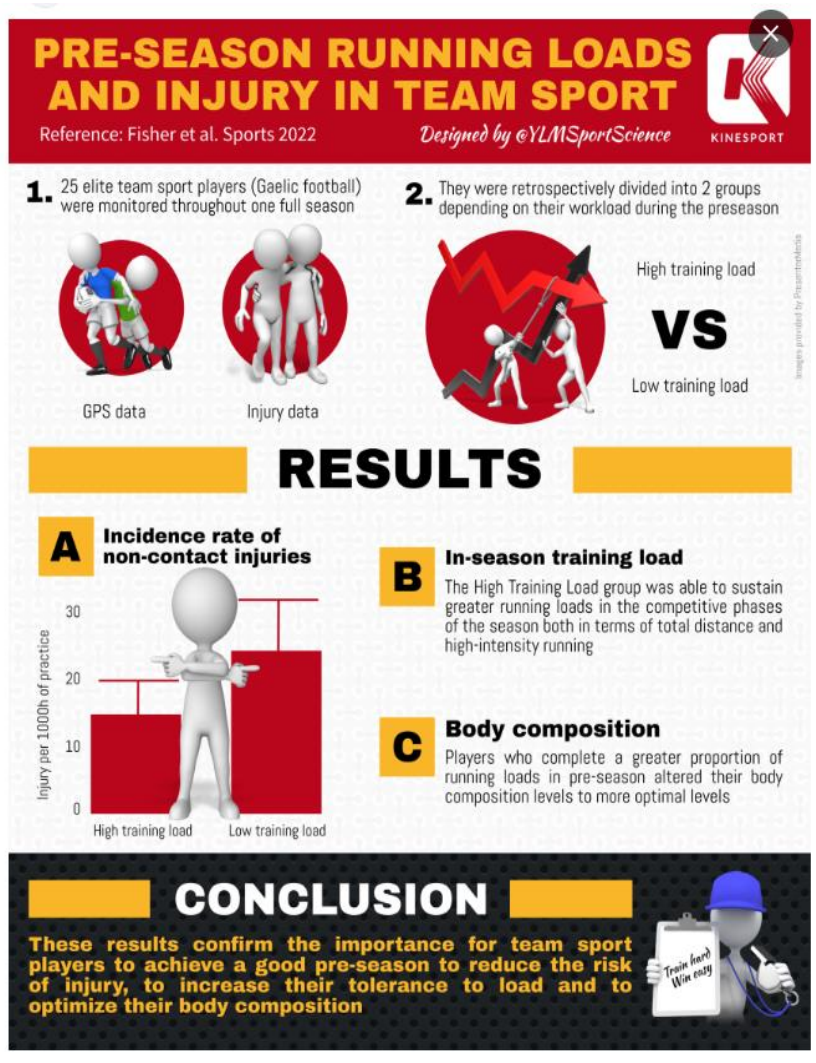
context

Importance of Strength Training

Lauersen, et al. (2014). The Effectiveness of Exercise Interventions to Prevent Sports Injuries: A Systematic Review and Meta-Analysis of Randomised Controlled Trials. *Br J Sports Med*, *48*(11), 871-877.

Intervention programs – injury prevention





Physical test - Asymmetry

Asymmetry Thresholds for Common Screening Tests and Their Effects on Jump Performance in Professional Soccer Players

Paul J. Read, PhD, CSCS*D*; Seán McAuliffe, PhD*; Chris Bishop, PhD†; Jon L. Oliver, PhD‡; Phil Graham-Smith, PhD§; Mohammed Abdulaziz Farooq, PhD, MSc, MPH*

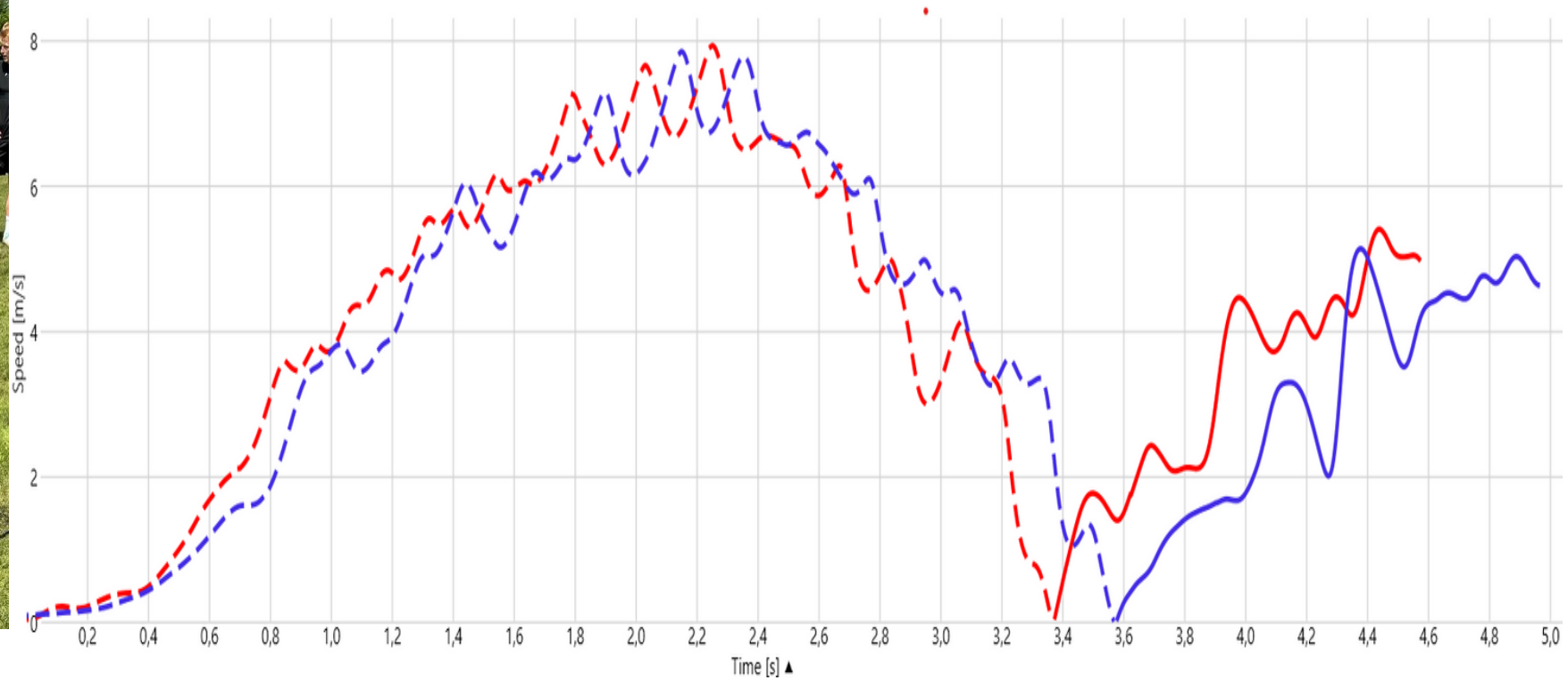
Table 2. Asymmetry Thresholds for Players in Each Quartile

	Absolute Asymmetry (%) Quartile			
Test Variable	Small (Q1)	Moderate (Q2)	Large (Q3)	Very Large (Q4)
Range of motion				
Bent-knee fall-out	≤5.7	5.8–12.5	12.6–20.9	≥21
Hip internal rotation, 90°	≤3.5	3.6–8.9	9.0–16.3	≥16.4
HAM peak knee extension	≤1.3	1.4–3.3	3.4–6.1	≥6.2
Ankle dorsiflexion	≤3.8	3.9–9.1	9.2–18.1	≥18.2
Strength				
QUAD: Concentric, 60°/s	≤4.4	4.5–7.4	7.5–13.4	≥13.5
HAM : Concentric, 60°/s	≤4.3	4.4–7.3	7.4–13.8	≥13.9
HAM: Eccentric, 60°/s	≤4.3	4.4–8.4	8.5–16.7	≥16.8
Functional HAM:QUAD	≤5.2	5.3–11.0	11.1–20.1	≥20.2
Adduction : abduction	≤6.2	6.3–12.7	12.8–19.8	≥19.9
NordBord	≤2.8	2.9–5.1	5.2–8.9	≥9
Eccentric hip adduction	≤3.8	3.9–8.1	8.2–14.1	≥14.2
Eccentric hip abduction	≤3.7	3.8–8.7	8.9–14.5	≥14.6
Jump				
Single-legged countermovement jump, height, cm	≤3.3	3.4–8.7	8.8–14.9	≥15.0
Single-legged countermovement jump, peak force, N	≤1.8	1.9–3.8	3.9–6.3	≥6.4
10-s Hop height, cm	≤4.6	4.7–10.3	10.4–18.0	≥18.1
10-s Hop reactive strength index	≤5.5	5.6–11.7	11.8–20.4	≥20.5

Abbreviations: HAM, hamstrings; NordBord, Nordic hamstrings curl (Vald Performance, Albion, Australia); QUAD, quadriceps

Physical test - Asymmetry

8.77% difference



Load monitoring: training and recovery

Association Between the Acute to Chronic Workload Ratio and Injury Occurrence in Young Male Team Soccer Players: A Preliminary Study

Hamid Arazi[1], Abbas Asadi[2], Farhood Khalkhali[1], Daniel Boullosa[3,4], Anthony C. Hackney[5], Urs Granacher[6†] and Hassane Zouhal[7*†]*

Training Load and Its Role in Injury Prevention, Part I: Back to the Future

Franco M. Impellizzeri, PhD*; Paolo Menaspà, PhD; Aaron J. Coutts, PhD†; Judd Kalkhoven, BSportExSc(Hons)*; Miranda J. Menaspà, M. Sports Physio, FACP‡

The Influence of Changes in Acute Training Load on Daily Sensitivity of Morning-Measured Fatigue Variables in Elite Soccer Players

Robin T. Thorpe, Anthony J. Strudwick, Martin Buchheit, Greg Atkinson, Barry Drust, and Warren Gregson

Training Load and Its Role in Injury Prevention, Part 2: Conceptual and Methodologic Pitfalls

Franco M. Impellizzeri, PhD*; Alan McCall, PhD†; Patrick Ward, PhD‡; Luke Bornn, PhD§; Aaron J. Coutts, PhD*

Load monitoring: training and recovery

Training Load and Its Role in Injury Prevention, Part I: Back to the Future

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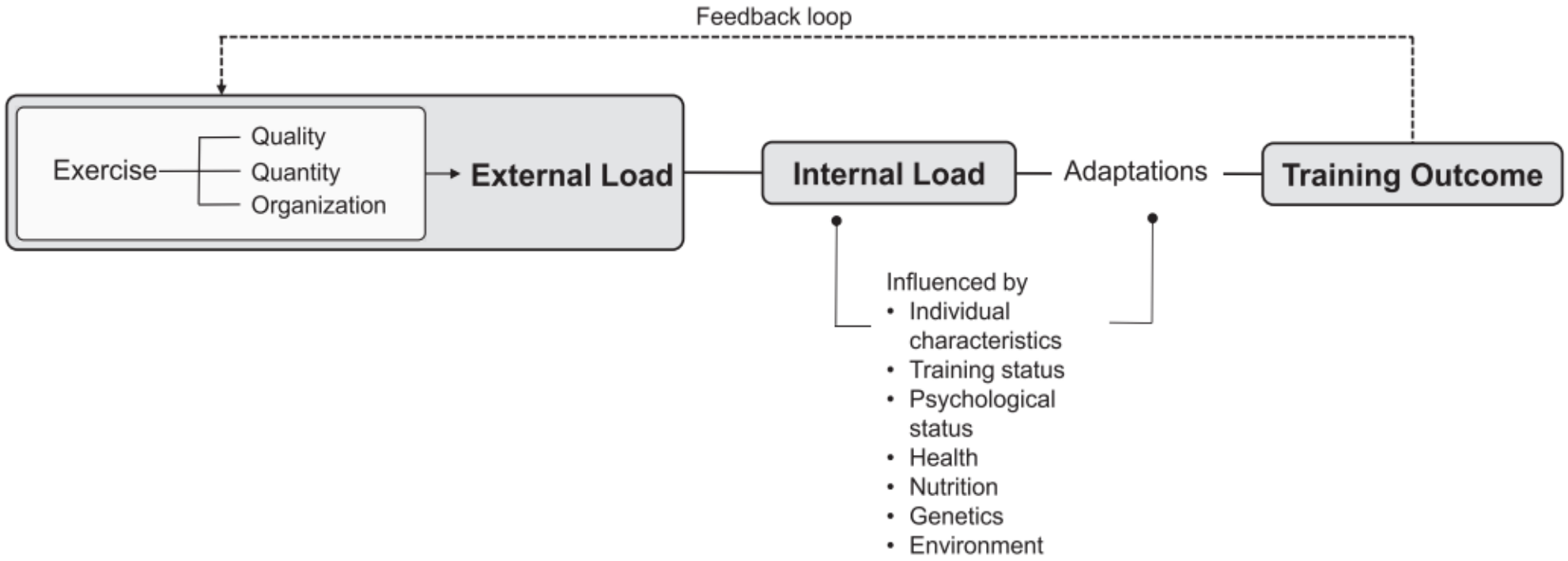
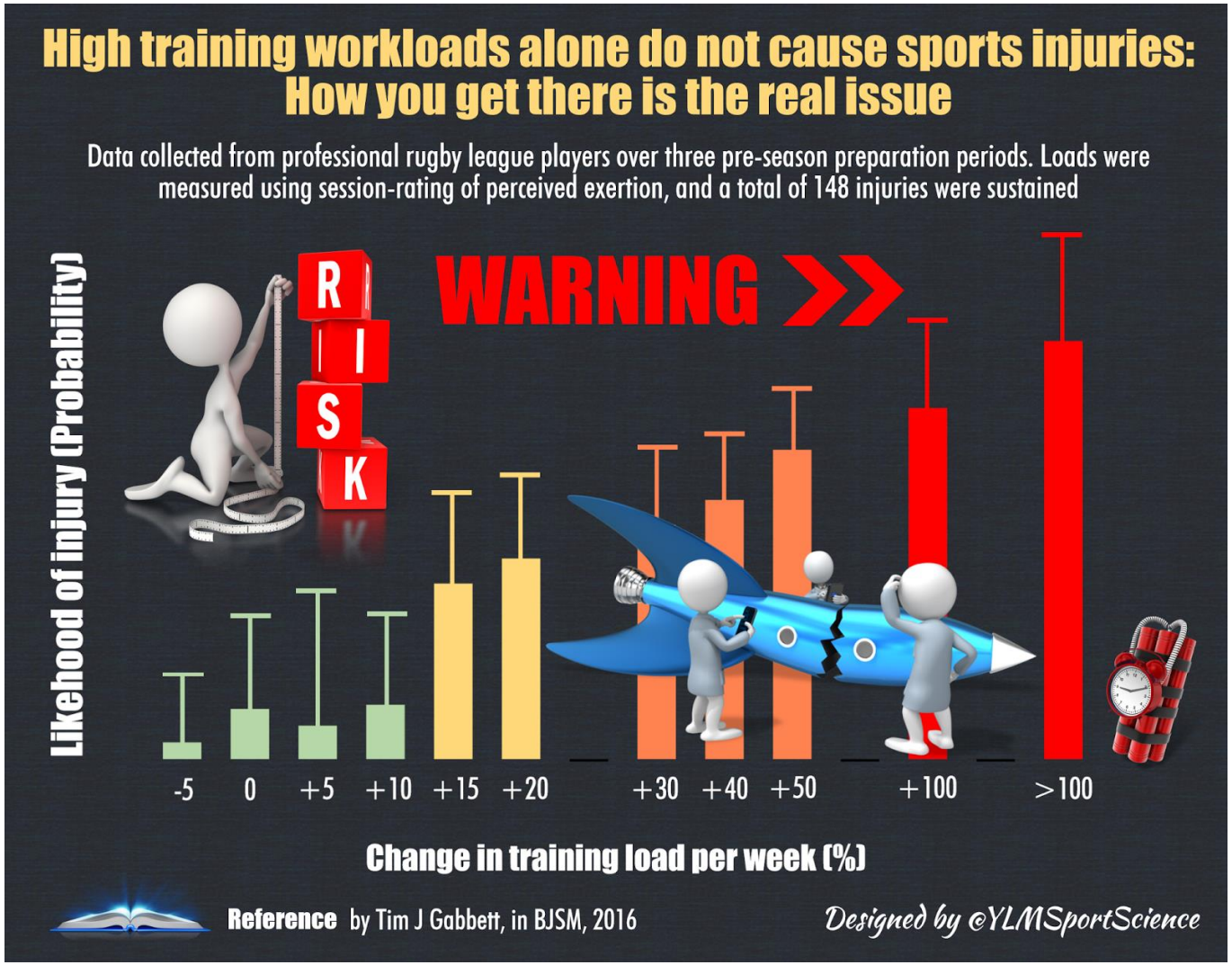
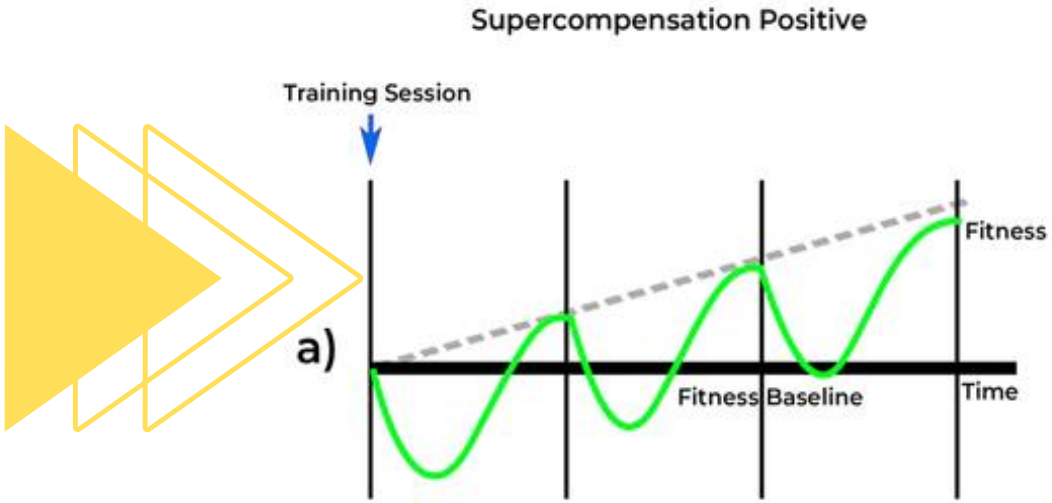


Load monitoring: training and recovery

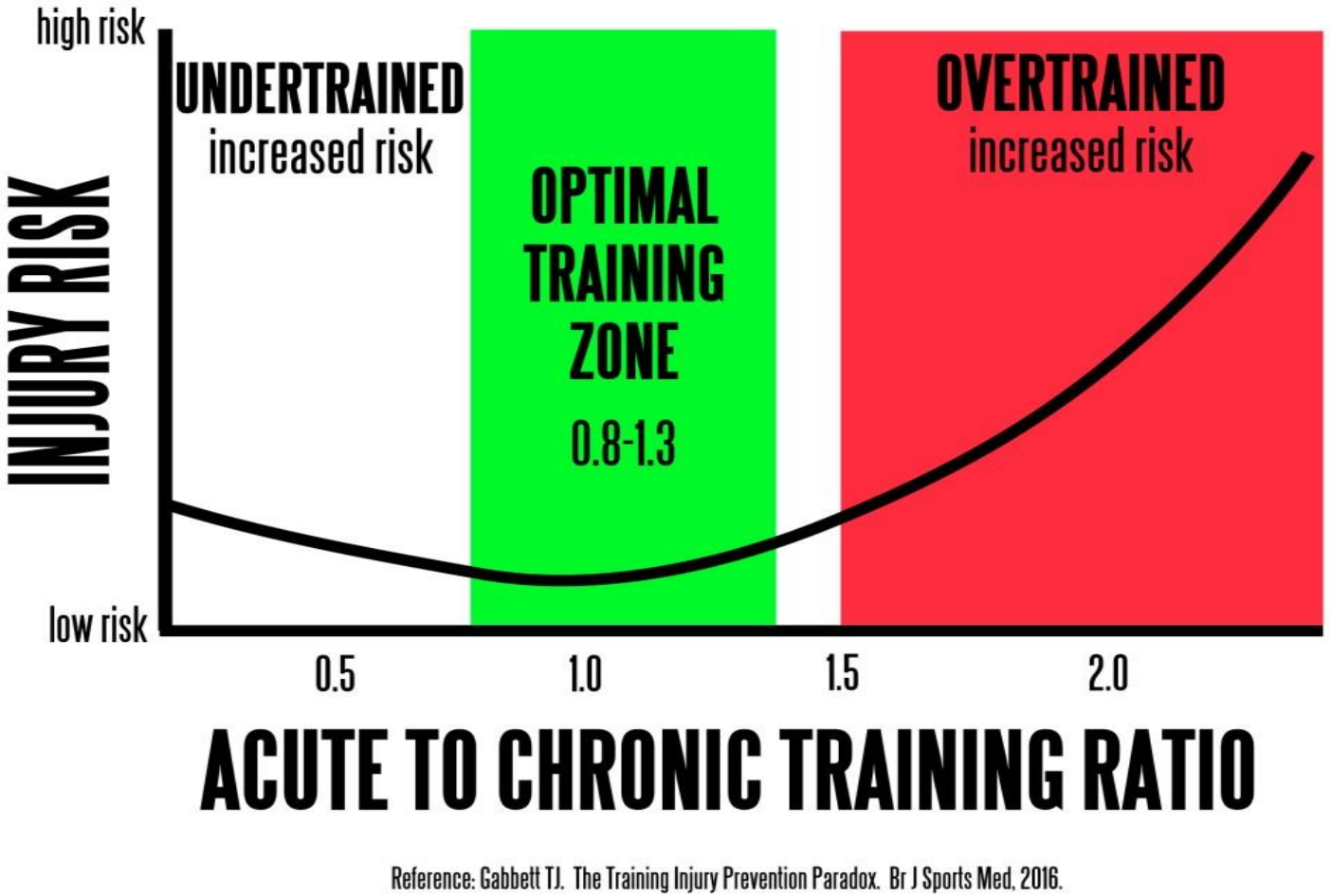




Load monitoring: training and recovery

Acute:Chronic Workload Ratio

$$ACR = \frac{WL_{Acute}}{WL_{Chronic}}$$



Reference: Gabbett TJ. The Training Injury Prevention Paradox. Br J Sports Med, 2016.

Load monitoring: training and recovery

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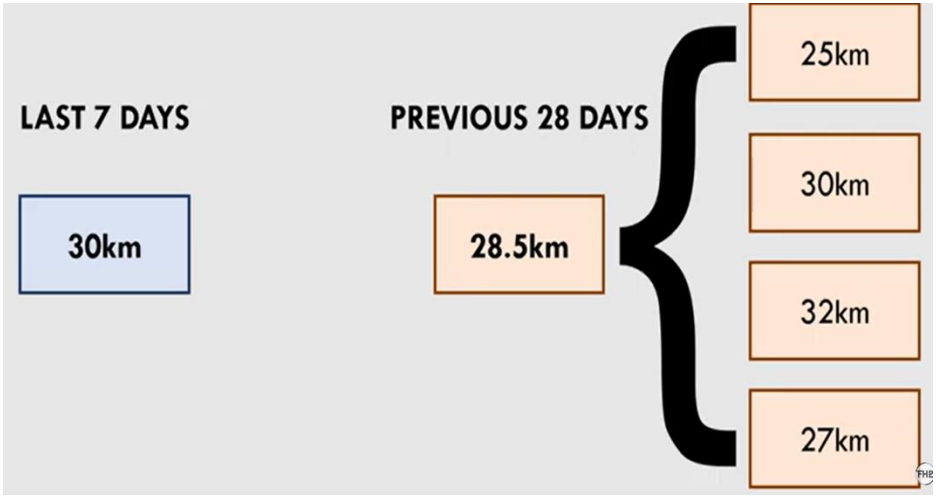

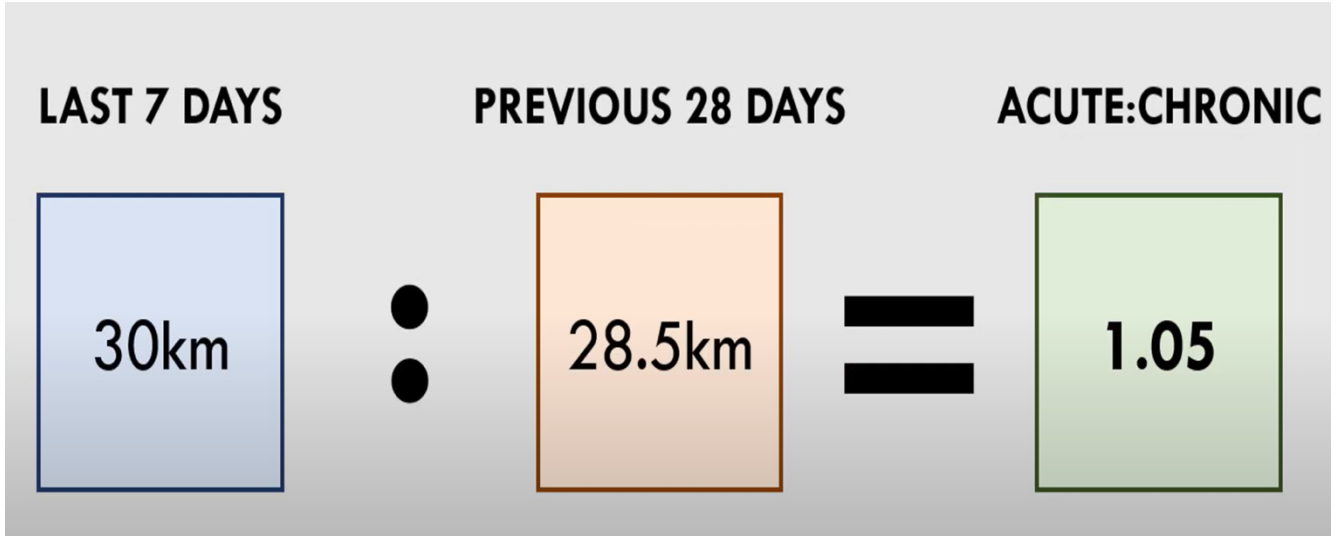

Load monitoring: training and recovery

Acute to chronic workload ratio ACWR									
Weeks		Mon	Tue	Wed	Thu	Fri	Sat	Sun	AWL
1	Plan	Rest	Easy run	Cross train	Speed run	Easy run	Easy run	Long run	
	Duration in mins	0	60	45	60	60	60	120	
	RPE	0	4	5	8	4	4	7	
	Load = (RPE x mins)	0	240	225	480	240	240	840	2265
2	Plan	Rest	Easy run	Cross train	Speed run	Easy run	Easy run	Long run	
	Duration in mins	0	60	45	60	60	60	150	
	RPE	0	4	6	6	4	4	8	
	Load = (RPE x mins)	0	240	270	360	240	240	1200	2550

Manipulation of training load

PREPARATION

TRAINING APPLICATION

ATHLETES RESPONSE

INTERPRETATION/ADJUST

Registration

Increase performance, minimize risk of injury

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Commercial Platforms

Risk advisor (injury): based on players training variables

KITMAN LABS

LOAD CONTROL

ACTIMET

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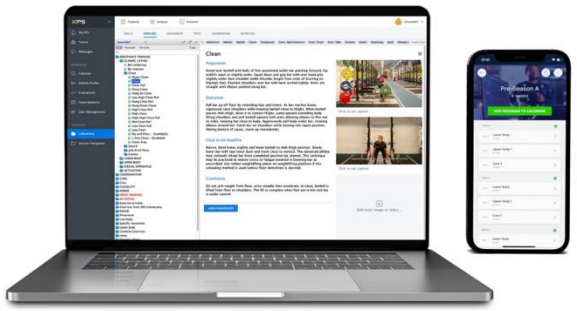
Commercial Platforms

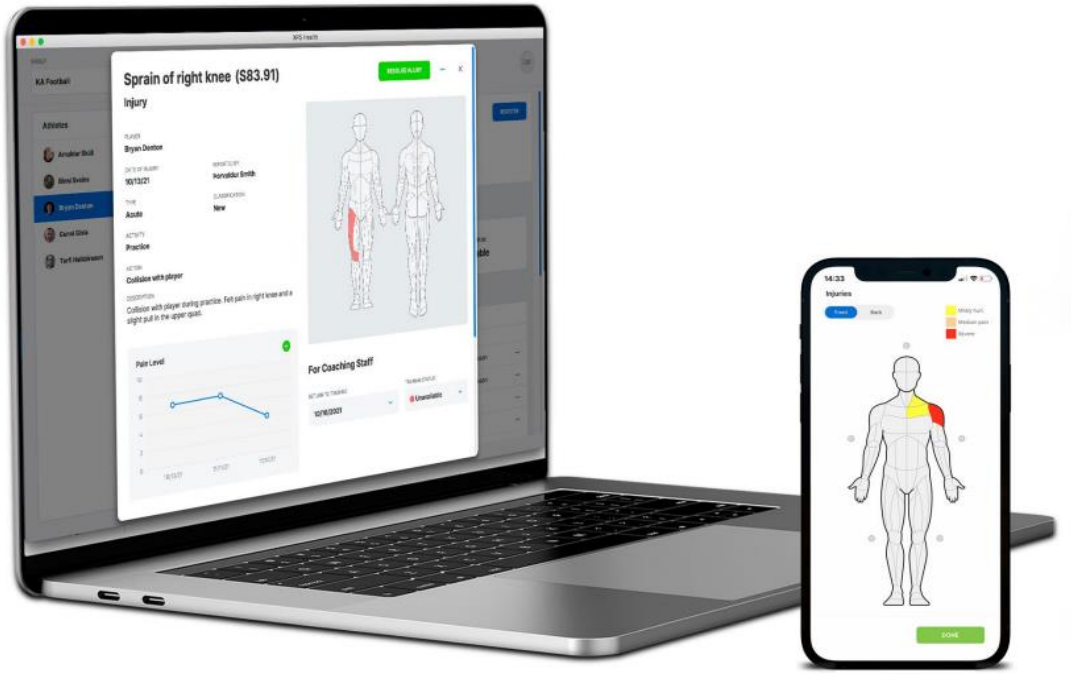
XPS network

Complete software solution for clubs, coaches and athletes.

Strength & Conditioning

Video library with thousands of exercises.
Get instant feedback on your athlete's progress.





More about injury prevention?

British Journal of
Sports Medicine

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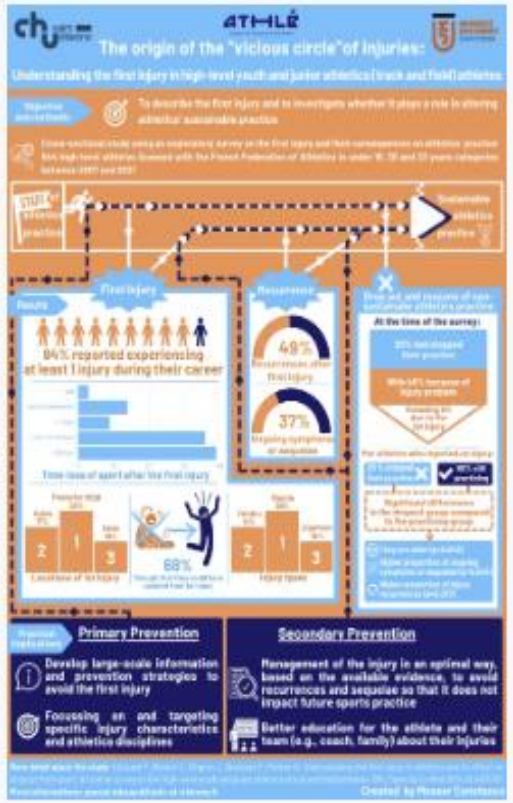

The origin of the "vicious circle" of injuries in athletics (track and field)

Posted on April 8, 2024 by jenduncan

Keywords: Injury; epidemiology; injury prevention; injury risk factors; youth; growing. This blog summarises a recently published study to better understand the primary injury in athletes and investigate if it plays a role in their performance and career (1). The main findings of this study are displayed in the attached infographic and portray the main findings [...]

Read More...

General

THANK YOU

carolina.paludo@fsps.muni.cz