

# Building Robustness in Youth Athletes

Strategies for Coaches, Parents & Athletes

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# Learning outcomes

- Part One
  - Robustness: what it is & why we need it?
  - Key elements for physical robustness
  - Capacity testing & MSK Screening
  - Additional considerations
- Part Two
  - Common injury types
  - What will you do?
  - Injury prevention: Must/Should/Could

# My Background



## Education:

- BSc Sports Rehabilitation & Injury Prevention (2019)
- MSc (Pre Reg) Physiotherapy (2012)

## Working Life:

- Musculoskeletal & Sports Physiotherapist @ Witty, Pask & Buckingham in Northampton
- Talent Pathway Physiotherapist: England Athletics
- Age Group Physiotherapist: British Athletics



# What do we mean by robust athletes?



STRONG



HEALTHY



STRONGLY  
CONSTRUCTED



STURDY

***“A healthy, powerful and vigorous athlete that is resilient to the demands placed upon them”***

***“the capacity to withstand stressors, recover and adapt”***

# Why do we want to build a robust athlete?

Adolescent Athletes have higher rates of susceptibility to musculoskeletal injuries associated with growth, maturation and/or overuse

Research states 25% of youth athletes stop sports participation due to injury

Achilles tendon – up to 12.5x body weight (BW)

Patellar tendon – 4.7-6.9x BW

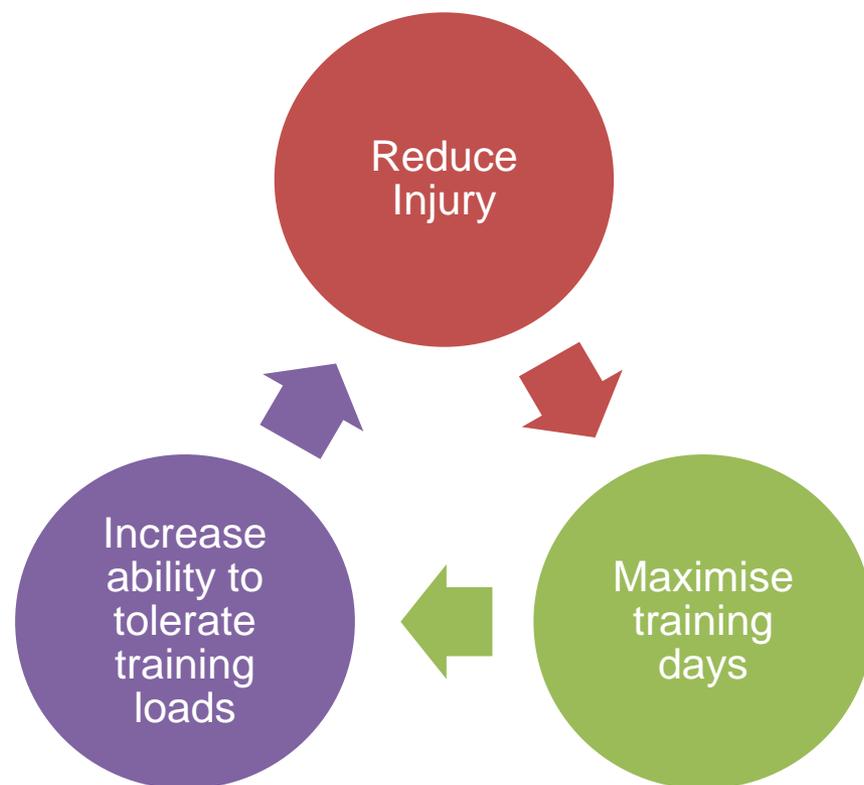
Patellofemoral Joint – 7-11.1x BW

Shoulder load in wheelchair propulsion – 1.5 -2.5 x body weight in first 3 pushes

Bone loading forces: 3 x BW with running & 4+ x BW with jumping

IOC Consensus (2015) for youth athletic development:

*“The goal is clear: Develop health, capable and resilient young athletes, while attaining widespread, inclusive, sustainable and enjoyable participation and success for all levels of individual athletic achievement”*



Consensus statement

International Olympic Committee consensus statement on youth athletic development

# Key Elements of Physical Robustness

Load  
Management

Biomechanics

Mobility

Muscle  
Strength

Tissue  
Capacity

Recovery

# Training Load Management

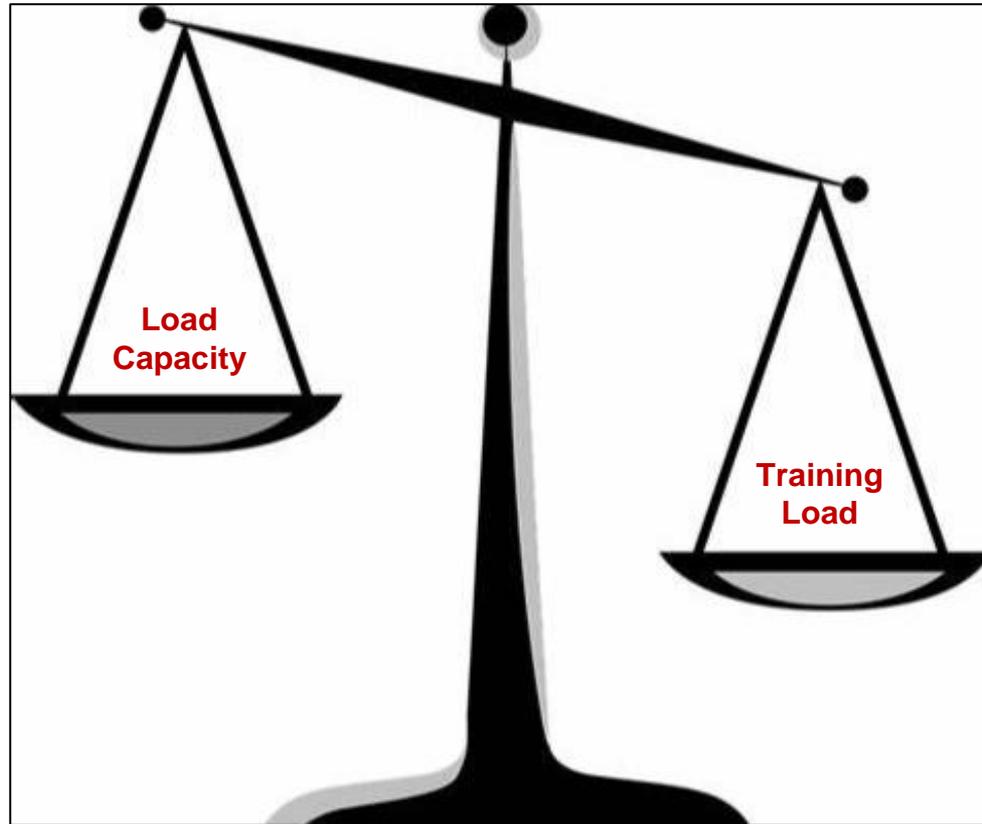
The 2016 IOC Consensus Statement defines load management as:

*"the sport and non-sport burden (single or multiple physiological, psychological or mechanical stressors) as a stimulus that is applied to a human biological system. Load can be applied to the individual human biological system over varying time periods (seconds, minutes, hours to days, weeks, months and years) and with varying magnitude (i.e. duration, frequency and intensity)."*

Consensus statement

How much is too much? (Part 1)  
International Olympic Committee consensus  
statement on load in sport and risk of injury

**Systematic increase in training load over time + adequate recovery  
= performance improvements & reduction in injury risk**



# Scientific monitoring of load management

Coaches and support staff should invest in scientific methods to monitor the athlete's load and detect meaningful change.

External Monitoring	Internal Monitoring
Training/Competition; Time, Frequency & Type	Perception of effort (RPE)
Distance & Movement Repetition	Sleep: quality & duration
Power output, Speed, Acceleration	Heart Rate
Neuromuscular Function: Jump testing, Isokinetic Dynamometry	Blood Lactate concentrations

**\*\*Always monitor load individually to each athlete\*\***

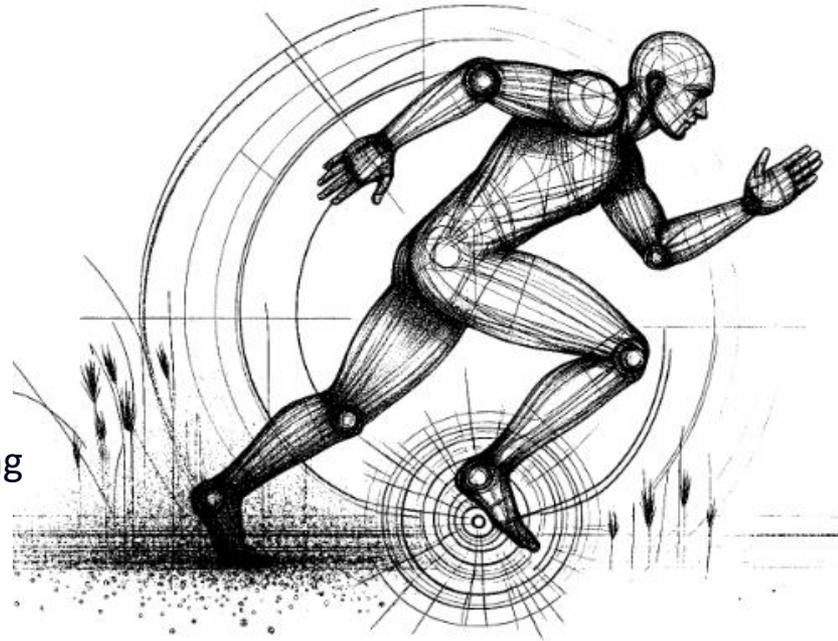
# Biomechanics

## What?

- Analysis of the mechanics of human movement
- The interaction between the performer, their equipment and the environment

## Why?

- Identification of optimal technique
- The assessment of muscle recruitment and loading
- The analysis of sport and exercise equipment  
e.g., shoes, surfaces, wheelchair, implement

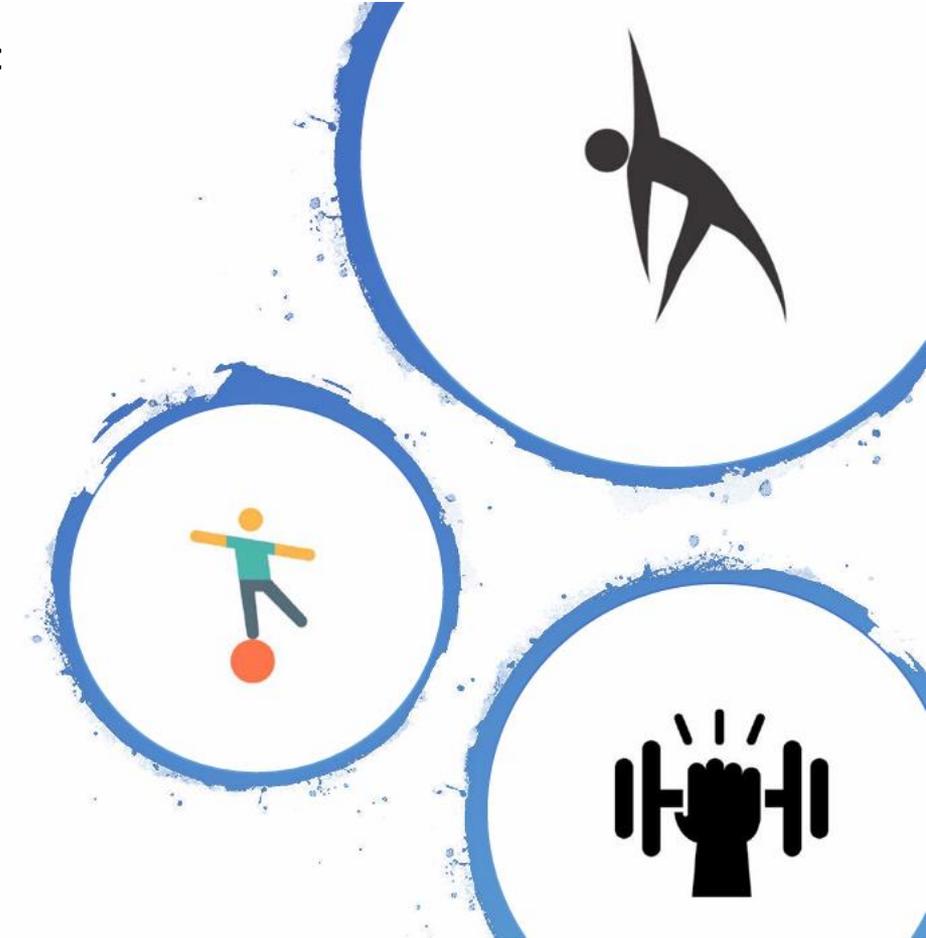


To achieve optimal Biomechanics we need optimal:

MOBILITY  
(SKELETAL)

CONTROL  
(NEUROLOGICAL)

STRENGTH  
(MUSCULAR)



# Mobility

## Mobility

- The ability to move freely and with ease

## Muscle Flexibility

- The ability of muscles and soft tissues to move through an unrestricted, pain-free range of motion

## Joint Mobility

- The capacity of a joint to move passively, considering joint surfaces and surrounding tissue (muscle, tendon, ligament, synovium, capsule, cartilage, bone)

12-20 degrees of ankle dorsiflexion is needed for sufficient ankle function

Sprinting requires 50 degrees of big toe extension

10-15 degrees hip extension at “toe off” phase needed during running stride

Note: the body will self-organize

Area Targeted	Exercise
Lower back	Cat/cow → cobra → child's pose
	Lower back rotations (or iron cross or scorpion)
Mid back	Thread the needle (add foam roller)
	Kneeling thoracic rotations
	Bench thoracic extension
Shoulders	Book opens (with arms bent)
	Kneeling lat stretch
Hips	90/90s + side leans
	Pigeon stretch
	Hip flexor stretch → quad stretch → hamstring stretch
	Hamstring stretch variations lying supine
	Sciatic nerve sliders
	Adductor stretch (+/- thoracic rotation, in sitting)
Lower legs	Calf stretch x 2
	Knee to wall mobilisations
	Sit onto heels - tib ant stretch
	Peroneals foam rolling
	Plantar fascia foam rolling
Combined movements	Kneeling lunge Tx rot
	Brettzel 2.0

# Neuromuscular control

## What?

- Control of joint movement through full range.
- Consists of
  - Co-ordination
  - Balance
  - Proprioception

## Why?

- In power or strength-based sports it allows for a greater ability to exert a force, or to exert that force more efficiently.
  - Neuromuscular control develops first rather than pure strength (eg first 6 weeks of programme)
- 

# Muscle Strength & Tissue Capacity

**Is strength training appropriate for young athletes?**

**YES\***

\*Considering biological age and psychosocial maturity level of the child or adolescent

Resistance training prescription should be based on an appropriate progression according to training age, motor skill competency, technical proficiency and existing strength levels.

- Maturation development needs **stability before strength**
- Emphasis on **balance, co-ordination** and **good movement patterns**
  - Resistance training in all forms (e.g. strength, power or speed training)
- Stronger young athletes will be better prepared to learn complex movements, master sport tactics, and sustain the demands of training and competition

## Movement Patterns

- Squat
- Lunge
- Hip Hinge
- Calf raise
- Trunk Control
- UL Push
- UL Pull

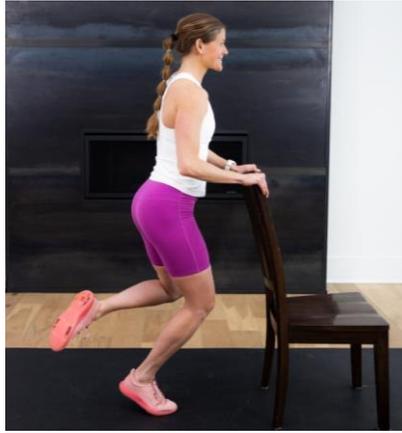


## Tissue Capacity

- How many of X exercise / movement can you do?
- Single leg calf raises / Single leg bridge / Single leg squat

## Muscle Strength

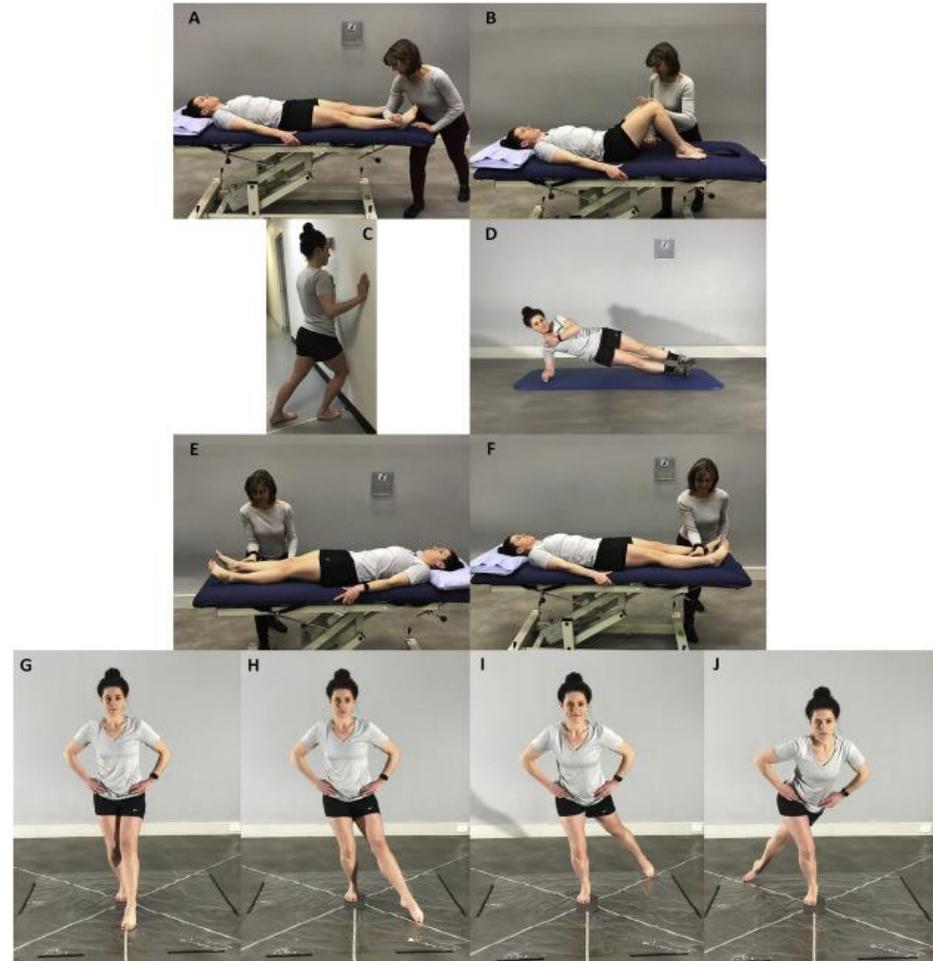
- How much load can a muscle tolerate for a given number of reps?
- 1RM / 3RM / 10RM



# Musculoskeletal Screening

AKA - Getting to Know You

- Points of reference
- What's your normal?
- Targeted interventions
- Data & Injury Profiling



# Training Recovery



HOW MUCH SLEEP IS ENOUGH?  
DO YOU GET ENOUGH SLEEP?



WHAT ELEMENTS OF NUTRITION  
ARE IMPORTANT FOR RECOVERY?



WHAT DO YOU DO TO RELAX /  
SWITCH OFF?

# The Balancing Act of Sport and Knowing Your Athlete



# Prevention

Education of Athlete and Stakeholders

Targeted Need (appropriate knowledge base)

Don't neglect athletes' complaints of pain or fatigue

Seek Help / guidance

Develop a strategy (with outcomes)



# Enable athletes to CEE



## **C = Cognitive Understanding**

What's wrong in their language  
+ Context

## **E = Education**

How and Why. Inc  
Reassurance ++

## **E = Empowerment**

What they can do - Skills (HEP)  
etc

# Management strategies for the athlete and the environment

**Maximise Benefit**

**Minimise Harm**

‘Psychological maladaptations’

Consensus statement

Mental health in elite athletes: International Olympic Committee consensus statement (2019)

# HOW COACHES CAN SUPPORT THEIR ATHLETES MENTAL HEALTH



scottishathletics



BRITISH ATHLETICS



## CHECK IN

Regularly debrief with your athletes and check in with how they are feeling



## REST AND RECOVERY

Encourage athletes to schedule time into their week where they can engage in activities that provide them with a sense of calm and relaxation



## ACCESSIBLE

Be accessible for your athletes so it is easy for them to talk to you if they need to



## INTERPERSONAL SKILLS

Be patient, empathetic and understanding with your athletes. Listen to what it is they have to say



## BE PROACTIVE

Support athletes to think of helpful and practical ways they can boost their mental fitness each week (E.g. mindfulness, breathing techniques, worry diary)



## TIME FOR YOURSELF

Make sure you are being proactive and looking after your own physical and mental wellbeing



## HOLISTIC APPROACH

Take a holistic approach by paying attention to the things going on outside of training



## STAY CONNECTED

Encourage athletes to keep connected to their teammates, friends and family on a regular basis



# HOW YOUNG ATHLETES CAN LOOK AFTER THEIR MENTAL HEALTH



scottishathletics



BRITISH ATHLETICS



## KEEP CONNECTED

Keep in contact with teammates, your coach, friends and family on a regular basis



## PHYSICAL HEALTH

Take care of your physical health and make sure you are eating well, staying hydrated and maintaining a positive sleep routine



## HELP OTHERS

Whether it is helping around the house or supporting your brother or sister, helping others can provide you with positive emotions



## LIMIT SOCIAL MEDIA/NEWS

Limit the amount of time you spend on social media and checking news



## TALK TO OTHERS

Don't be afraid to talk to others about how you are feeling. If you are struggling reach out to your GP or a mental health charity for help



## GOAL SETTING

Set some new goals that you would like to achieve. This can help boost confidence and motivation



## SCHEDULE YOUR WEEK

Use a weekly planner and organise your week. Remember to schedule in activities that provide you with a sense of achievement and keep you connected to people



## MENTAL FITNESS

Work on boosting your mental fitness by identifying some helpful things you can do when you feel stressed, worried or anxious



## SELF CARE

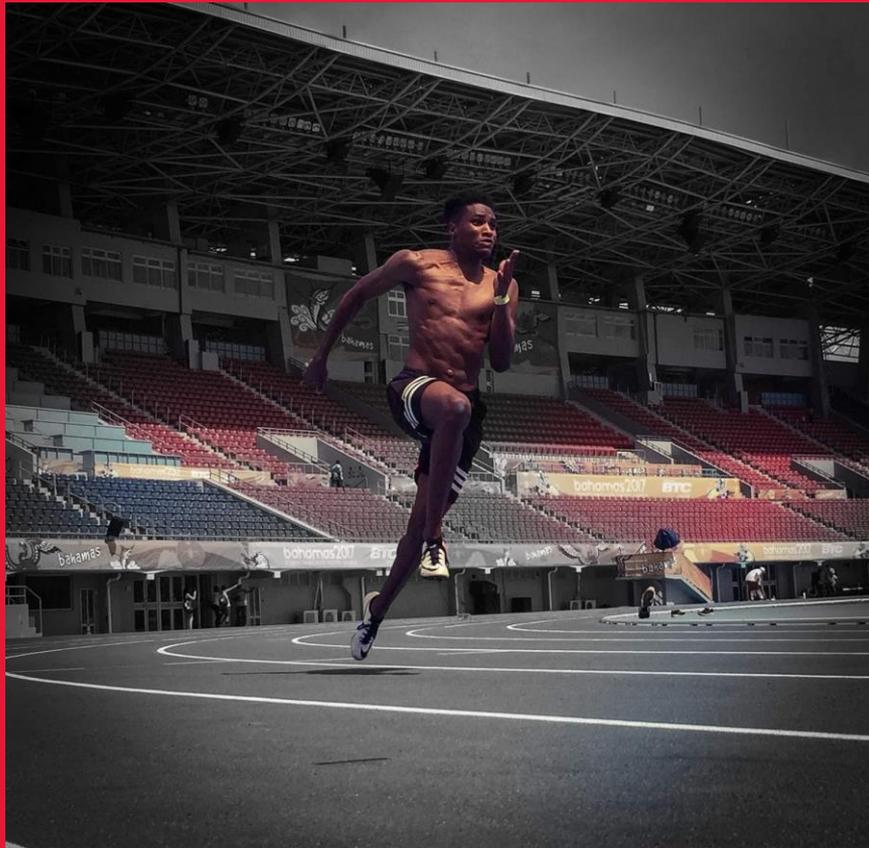
Find time for yourself during your week where you can engage in relaxing activities that help calm your mind and body



# Language

- Be extremely careful with WORDS
- Power to make or break a young athlete





# Injury - What happens?

# Common types of injuries

## Acute

An acute incident that exceeds the physical capabilities of a structure

*“It went pop”*

## Overload

(Chronic / Persistent)

Repetitive load that exceeds the physical capacity of a structure

*“It’s getting more sore”*

*“Over days or weeks”*

# DON'T PANIC

## HURT

- DOMs  
(Delayed Onset of Muscle soreness)
- Settles with days

**Vs**

## HARM

- Sharp shooting pains
- Burning sensations
- Immobility
- Night pain
- Lasts more than a couple of days
- Unfamiliar pain



**What are you going to do when you get injured?**

# You need a Plan...

- Who's going to help you? Coach / Therapist / S+C
  - What potential areas are you going to work on?
  - What physical characteristics are you going to try and improve?
  - How are you going to look after your mental health and wellbeing?
  - How is your season going to develop?
  - Planning for stress: Exams?
- 

# PRICE:

Protection

Rest

Ice

Compression

Elevation



**P**



## PROTECTION

Avoid activities and movements that increase pain during the first few days after injury.

**E**



## ELEVATION

Elevate the injured limb higher than the heart as often as possible.

**A**



## AVOID ANTI-INFLAMMATORIES

Avoid taking anti-inflammatory medications as they reduce tissue healing. Avoid icing.

**C**



## COMPRESSION

Use elastic bandage or taping to reduce swelling.

**E**



## EDUCATION

Your body knows best. Avoid unnecessary passive treatments and medical investigations and let nature play its role.

**&**

**L**



## LOAD

Let pain guide your gradual return to normal activities. Your body will tell you when it's safe to increase load.

**O**



## OPTIMISM

Condition your brain for optimal recovery by being confident and positive.

**V**



## VASCULARISATION

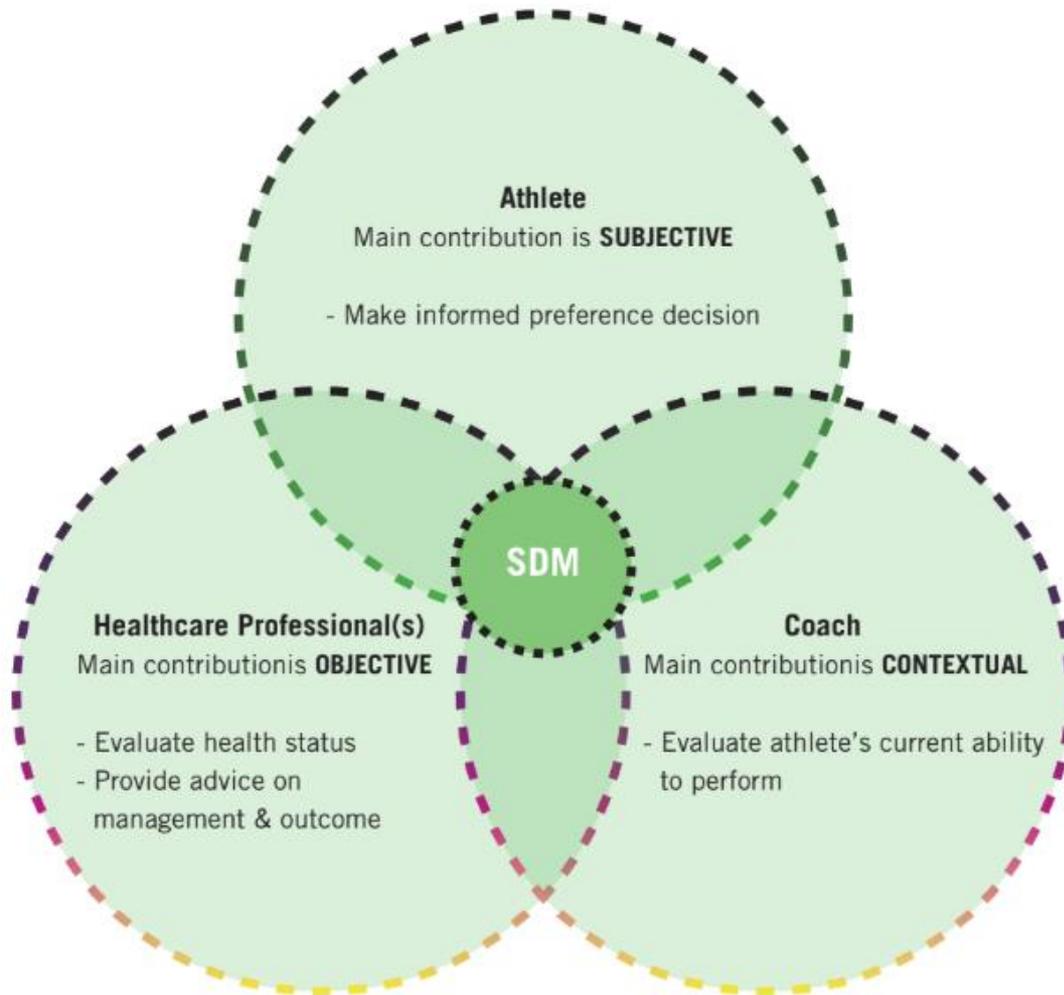
Choose pain-free cardiovascular activities to increase blood flow to repairing tissues.

**E**



## EXERCISE

Restore mobility, strength and proprioception by adopting an active approach to recovery.



# Shared Decision Making

# Must / Should / Could Dos

## Key Focus

**MUST DOs** - your training, Key S&C, Sleep, Fuel

**SHOULD DOs** - this will benefit me

ie: S&C, Recovery, etc

**COULD DOs** - ONLY when you've done the rest

ie: Supplements, Cryotherapy

**ATHLETE SPECIFIC**

## Start with the Problem and Reverse Engineer Backwards

- What's the end Goal?
- What physical characteristics do you need?
- What's the Injury / Training History?
- What Skill Based characteristics do you need?
  
- **With who? Support Team**



reverse  
engineer



# Injury Reflection - What can we do better?

**Injury**

**Diagnosis**



**Reflection:  
Internal Vs  
External  
Factors**

**Return  
to  
Sport**

**Conditioning  
Vs Screening Data**

**Rehab +  
Plan / Timeline**

# SUMMARY

- Injury potential is always present
- By raising awareness of potential sites / mechanisms of injury coaches will be better placed to recognise, and minimise.
- Profile yourself – what are you likely to suffer from.....
- Don't panic – seek suitable help

# **Final Thoughts**

**Individual Robustness is a  
COLLECTIVE  
RESPONSIBILITY**

**Support Network  
Your week / Schedule -  
How are you managing  
and monitoring**