





Keeping Kids in the Game for Life

Designing an injury prevention programme for schoolchildren



**STOP
SPORTS
INJURIES**

Recommendations for an injury prevention intervention programme

- What is your goal? Research or practical?
- Do you want a general injury prevention programme or do you want to just target Acute injuries?
- If general, you need to be involved from an education viewpoint. Educate regarding risk factors.
- Ideally, this needs to be part of the sports programme.

Acute Injuries

Recommendations for an intervention programme

- Perform one or two **strength training** sessions a week, perhaps at the end of practices. Exercise the whole body – Core work and specific muscles.
- Perform **agility and proprioception** exercises twice a week.
- Combine interventions? (Smaller effect size. Due to non compliance?) . More practical and logical to combine.

Overuse Injury & Burnout prevention

Risk factors

INTRINSIC:

- ★ 1. Prior injury +++
- ★ 2. Growth spurt+++
- ★ 3. History of amenorrhea+++
 - 4. Joint hypermobility + (especially during adolescence)
- ★ 5. Readiness + (physical & psycho-social , NOT age)
- 6. anatomic malalignment 0, flexibility 0, functional control of movement 0

EXTRINSIC:

- ★ 1. Higher training volumes++,
- ★ 2. Overscheduling+ (++ Recovery time)
- ★ 3. Poor fitting equipment+
- ★ 4. Sport specialization +

+++ : Strong predictor of future injury/burnout

++ : Moderate predictor

+ : Mild predictor

0 : Poor evidence, not considered a predictor.

Ref DiFiori et al, 2014

Overuse Injuries

Recommendations for an intervention programme

- Same recommendations as for acute injuries, but focus on preventable★ risk factors first. (Education & Communication)
- Proper technique.
- 10% rule: A child should not increase his or her volume of training by more than 10 percent a week.
- Monitor training workload and growth rates during growth spurt especially early adolescence.

Take Home messages:

Promote Strength & Agility training in school sport

- Use a variety of strengthening techniques: therabands, weights, medicine balls, swiss balls, body weight, gravity
- Agility & proprioception exercises should be sports specific
- As a professional, guide the coach on what muscles to focus on for which sports.

What to do in a warm up session for kids

- $\frac{1}{2}$ - $\frac{3}{4}$ speed jogging and backwards jogging
 - Warm up with **active, dynamic mobility** exercises. *Move through the range of motion you'll need – stretching?*
 - $\frac{3}{4}$ speed sport specific coordination training – anything that challenges **balance / stability and agility**: *bounding, hopping & diagonal cutting.*
 - Include a few **strengthening** exercises for muscles that tend to become strained in their sport – *for many sports, this will be the hamstring and groin muscles.*
- (Cool down: include static stretches and allow time to drink fluid)

What is Conditioning?

Physical conditioning usually has multiple components including:

- power,
- strength,
- speed,
- balance,
- agility,
- Coordination
- endurance.

To improve fitness and sports performance, physical conditioning is often included in athletic sports and exercise training.

Conditioning programs also involve cross-training— using various sports or exercises to improve overall performance.

Risks of a paediatric conditioning programme

- Acute and overuse injuries can occur with conditioning programs.
- **Acute musculoskeletal injuries**, such as muscle strains, fractures, and dislocations typically involve a traumatic event.
- **Overuse injuries** occur when athletes increase the frequency, duration, intensity, or resistance of training (the weight) **too rapidly**, putting too much stress on a part of the body.
- Coaches need to design their training programs with an **end goal** in mind. Trying to achieve the goal **too quickly** might put child at risk for an overuse injury such as a stress fracture or shin splints.
- Weight lifting should be avoided under age of 18.

Always consider pre season training.

Strength Training in Children

What is strength training?

A specialized method of conditioning: involves a wide range of materials and activities, including dumbbells, elastic bands, strap-on weights, weight machines, core exercises, medicine balls, and body weight exercises that are specifically designed to enhance or maintain muscular fitness.

Strength Training in Children

- No minimum age.
- Children & adolescents are not mini adults (*eg. 8 year old and a Nordic Hamstring Curl?*)
- Adequate warm up (5-10 mins)
- 60% of 1 RPM for the average child for the average sport*
- Start with NO LOAD. Get technique right first.
- Three sets of 10-15 reps without cheating
- Strengthening train 2 to 3 times per week on nonconsecutive days
- 10% rule. Progression.
- Use a variety of strengthening techniques
- Close supervision, individual effort and levels

*Guidelines regarding weight prescription for strengthening

Pure Strength: 75-90% 1 RM (Repetition maximum) 5-10 reps (aim for 10)

Muscular endurance: <60% 1RM 15-20 reps

Strength Training in Children

What should the programme include?

- A general programme: “comprehensive capacity”; more sports-specific areas may be addressed subsequently, if there is a need.
- Keep the program fresh and challenging by systematically varying the training program.
- Preadolescents and adolescents should avoid powerlifting, bodybuilding, and maximal lifts until they reach physical and skeletal maturity.
- Class Structure (Fluids and proper nutrition, Illness or injury , 10- to 15-minute dynamic warm-up, Proper exercise technique and learning fundamental training principles).
- Cool down with less intense activities and stretching/mobility/yoga.
- The role of stretching.
- Instructors or teachers should have certification reflecting specific training in pediatric strength training.
- Medical & parental consent

Core Training in Children

How important is the “core”?

Take home messages:

1. You should strength train and put more emphasis on general strength training than just your core.
2. Many basic strength training exercises also train the core.
4. Basic sport/exercise provides the stimulus for endurance adaptations in your core just like all your other systems.
5. To train at true comprehensive capacity and be well rounded, your core workout should also address strength and power not just endurance and speed-endurance.

Play, play, play!!!!

Agility Training in Children

What should the programme include?

- Agility : agility is the ability to rapidly change directions without the loss of speed, balance, or body control.
- Includes Balance, Coordination, speed & Plyometrics
- Speed and agility programme should be based upon several factors:
 - Specific sport requirements : Distances (eg: 5-15 m); Work : rest ratios (eg: 1:2 to 1:4); Event duration (eg: 10 to 45 minutes); Intensities (sprint to jog); Agility factors (eg: specific direction changes, body positioning, surfaces); child's strengths and weaknesses; Scheduling and recovery restraints; Training goals within the time season
- Short recovery period between sprint intervals for the purpose of phosphogen energy system adaptation do not appear to be effective and enhancing motor skill development. Rest period lasting in excess of 6 minutes may improve speed more effectively (Merlau 2005).

Merlau S (2005). Recovery time optimization to facilitate motor learning during sprint intervals. Strength and Conditioning Journal, 27(2), 68-74.

A child's body make-up

Low connective tissue tone: better terminology to use to describe hypermobility or increased laxity in connective tissue.

Connective tissue **supports, anchors** and **connects** various parts of the body and is found in muscle, ligaments, surrounding organs and even in bone.

- Low connective tissue tone is mistakenly called “low muscle tone” (hypotonia*).
- A child's body make up , eg low connective tissue tone/hypermobility can be a risk factor for developing injuries
- Also associated to coordination and muscle strength difficulties

*Types of hypotonia: Lower motor neuron disease (neurological, metabolic and genetic causes) (Infections (Meningitis, Polio), Genetic (Down's, Prader-Willi, Tay-Sach's, Spinal muscular atrophy, Charcot-Marie Tooth Syndrome, Marfan and Ehlers danlos Syndrome); Metabolic (Rickets), Congenital Hypothyroidism, Genetic acquired(Muscular dystrophy,)

Low connective tissue tone

The Beighton score

Beighton's modification of the Carter and Wilkinson scoring system. Give yourself 1 point for each of the manoeuvres you can do, up to a maximum of 9 points.

	SCORE	
	Left	Right
1. Can you put your hands flat on the floor with your knees straight? _____		1
2. Can you bend your elbow backwards? _____	1	1
3. Can you bend your knee backwards? _____	1	1
4. Can you bend your thumb back on to the front of your forearm? _____	1	1
5. Can you bend your little finger up at 90° (right angles) to the back of your hand? ...	1	1

9

Beighton's Score

1. Hands to floor : 1
2. Elbow extension: L1 R1
3. Knee extension: L1 R1
4. Thumb to forearm: L1 R1
5. 5th finger 90: L1 R1

Total: /9

Strength Training in Children

Potential benefits of pediatric resistance training

- Increase muscle strength, power & endurance
- Enhance motor skill performance (why?*)
- Increase bone mineral density
- Improve body composition
- Improve insulin sensitivity
- Improve blood lipid profile
- Reduce risk of sport-related injuries
- Enhance sports performance
- Stimulate a more positive attitude toward lifetime physical activity

Faigenbaum AD and Myer GD. Pediatric resistance training: Benefits, concerns, and program design considerations. *Current Sports Medicine Reports* 9(3): 161–168, May/June 2010.

Know your child's age

There are a number of other ages which must be considered, including:

1. Developmental age
2. Skeletal age
3. General training age
4. Sport-specific training age
5. Relative age

WHY is it important for injury?

Monitor a child's growth

Regular (quarterly) height measurements in standing, crook sitting and arm span.

Identify Peak Velocity Height – the time when the child is growing the quickest.

Typical growth from year to year: Where is peak?

Year	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Height (cm)	5	4.8	5	4.8	5	4.8	8.6	12	7.7	3.3	2.3	1.9	1.3	0.9	0.5

Before you begin

Before starting any exercise or fitness program, athletes should **consult** with their medical doctor or a sports medicine physician or physiotherapist. School or team athletes often undergo **pre-participation physicals** where any concerns can be addressed.

Athletes recovering from surgery or an injury should **ask** the treating physician or physiotherapist how to safely work back into sports.

Athletes should **never avoid** going to the doctor to address aches and pains for fear of being told to stop training.

Untreated injuries can worsen or lead to more serious complications.

Coaches should also consider adding exercise or resistance programs that **differ** from the team's normal routines.

The Intervention

- Ideas- in the practical: Session 1 and Session 2
- Individualise and monitor progression
- Sports Specific but also “Comprehensive Capacity”

Thank you for listening!

My child fidgets/has poor posture/weak core/aches & pains/doesn't like sport - why ?

- Can't concentrate on one thing.
- A child's temperament: too shy or nervous/gives up/it's too much hard work
- Different brain development affects a child's ability to learn from everyday experiences- child does not learn by "doing".
- Sensory Overload
- Their bodies are floppy or bendy-low connective tissue tone
Lack of practice – leads to muscle weakness

