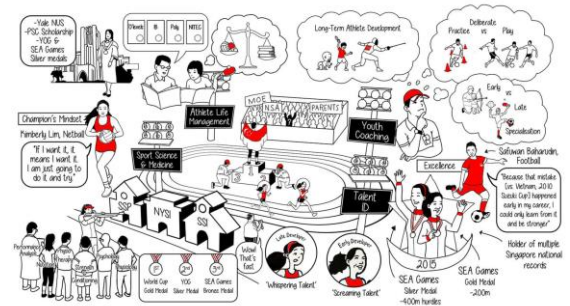




Talent Identification & Development



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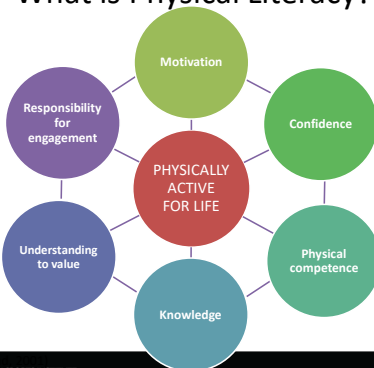
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Building strong movement foundations



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What is Physical Literacy?







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What is Physical Literacy?

Physical Literacy is the ability to *move* with **competence** and **confidence** in a wide variety of physical activities in multiple environments that benefit the healthy development of the whole person (Mandigo, Francis, Lodewyk, & Lopez, 2009)

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Other literacy models

| Literacy | Numeracy | Music | Physical Literacy |
|--|--|---|---|
| <ul style="list-style-type: none"> •ABC •Words •Sentences | <ul style="list-style-type: none"> •123 •Fractions •Equations | <ul style="list-style-type: none"> •Do-re-mi •Scale •Score | <ul style="list-style-type: none"> • Movement vocabulary • Sequences • Tasks |
|  |  |  |  |

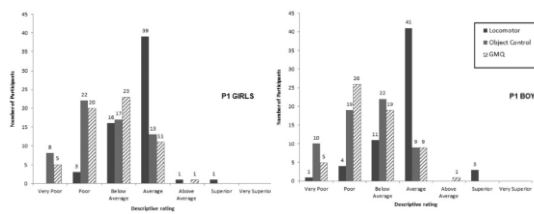
Why is physical literacy important?

The proportion of overweight and severely overweight children in our mainstream schools has increased from 11% in 2011 to 12% in 2015.

(Ministry of Health, 2016)

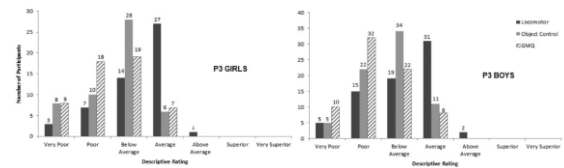


Why is physical literacy important?



(Mukherjee et al., 2012)

Why is physical literacy important?



(Mukherjee et al., 2012)

Process of building physical literacy

- Basic to Fundamental Motor Skills.
- Establish the basis for life-long participation by building competence and confidence.
- Must Be Fun!



Developmental Stages – Gross Motor



Fundamental Movement Skills and Physical Activity



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| YOUTH PHYSICAL DEVELOPMENT (YPD) MODEL FOR MALES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------------|---|---|---|---|-------------------|---|---|----|----|------------------------------------|----|----|----|----|--------------------------|----|----|----|-----|---------------------|--|--|--|--|--|--|--|--|--|
| CHRONOLOGICAL AGE (YEARS) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21+ | | | | | | | | | | |
| AGE PERIODS | EARLY CHILDHOOD | | | | | MIDDLE CHILDHOOD | | | | | ADOLESCENCE | | | | | ADULTHOOD | | | | | | | | | | | | | | |
| GROWTH RATE | RAPID GROWTH | | | | | ↔ STEADY GROWTH ↔ | | | | | ADOLESCENT SPURT ↔ | | | | | ↔ DECLINE IN GROWTH RATE | | | | | | | | | | | | | | |
| MATURATIONAL STATUS | YEARS PRE-PHV | | | | | | | | | | PHV | | | | | | | | | | YEARS POST-PHV | | | | | | | | | |
| TRAINING ADAPTATION | | | | | | | | | | | PREDOMINANTLY NEURAL (AGE-RELATED) | | | | | | | | | | | | | | | | | | | |
| PHYSICAL QUALITIES | FMS | | | | | FMS | | | | | FMS | | | | | FMS | | | | | | | | | | | | | | |
| | SSS | | | | | SSS | | | | | SSS | | | | | SSS | | | | | | | | | | | | | | |
| | Mobility | | | | | Mobility | | | | | Mobility | | | | | | | | | | | | | | | | | | | |
| | Agility | | | | | Agility | | | | | Agility | | | | | Agility | | | | | | | | | | | | | | |
| | Speed | | | | | Speed | | | | | Speed | | | | | Speed | | | | | | | | | | | | | | |
| | Power | | | | | Power | | | | | Power | | | | | Power | | | | | | | | | | | | | | |
| | Strength | | | | | Strength | | | | | Strength | | | | | Strength | | | | | | | | | | | | | | |
| TRAINING STRUCTURE | Hypertrophy | | | | | Hypertrophy | | | | | Hypertrophy | | | | | Hypertrophy | | | | | | | | | | | | | | |
| | Endurance & MC | | | | | Endurance & MC | | | | | Endurance & MC | | | | | Endurance & MC | | | | | | | | | | | | | | |
| | UNSTRUCTURED | | | | | LOW STRUCTURE | | | | | MODERATE STRUCTURE | | | | | HIGH STRUCTURE | | | | | VERY HIGH STRUCTURE | | | | | | | | | |

(Lloyd & Oliver, 2012)

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How do we develop physical literacy?

Provide more time for physical activity

Increase unstructured play time during recess or after school



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How do we develop physical literacy?

Plan physical education programmes that are fun, develop knowledge and skills that are developmentally appropriate

- Modified and small sided games
- Differentiating instruction by ability



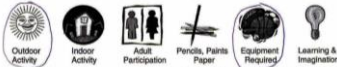
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Play Setting: (circle one)

Bedroom Local Neighbourhood Paved area Back Yard Indoor Area

Name of Activity: Follow the leader soccer juggling

Circle the appropriate symbols of your activity:



Equipment you will need: Soccer ball & four people

Description of the activity:

1) One person starts juggling the soccer ball. First the leader does a trick & passes it to the next person.
2) Second person does the same.
3) If a person drops or does something wrong they're out.

Who is this activity suitable for? Ages: 5 and up

Is there anything about this activity that could be unsafe? Soccer ball might hit you in the head.

(Switch-2-Activity, <http://www.goforyourlife.vic.gov.au>)

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Identifying Potential Champions of the Future



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Early TID is very difficult

The task

- Performance **structure** and **demands change** across athlete generations

The performer

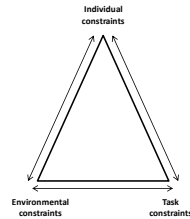
- Biological **maturational**, **relative age** (RAE), **psychological** qualities vary inter- and intra-individually over time.

The environment

- Prior** and **future training** and socio-material **environments** vary inter- and intra-individually over time.

Interaction of task, performer, and environment

- TID tests are **imperfectly** objective, reliable and valid



Early Youth Success ≠ Elite Senior Success

International medallists vs. non-medallists

Gülich, 2016

Sample

- 83 matched pairs Medallists and non-medallist matched by sport, age, gender
- Cgs sports (n=88), games sports (n=24), combat sports (n=16), artistic composition sports (n=10), others (n=28)
- Medallists: incl. 38 Olympic and World Champions

Age structure

| | Medallists M (s. SD) | Non-Med. M (s. SD) | p | d |
|--------------------------------------|-------------------------|-----------------------|------|------|
| Start main sport [years] | | | | |
| Practice | 11.8 (4.5) | 10.3 (4.0) | ** | 0.35 |
| Competitions | 13.2 (4.1) | 12.4 (3.9) | n.s. | 0.20 |
| Specialisation | 16.4 (6.0) | 13.4 (6.4) | * | 0.48 |
| Duration other sports [years] | | | | |
| Practice | 9.6 (6.6) | 6.6 (4.1) | ** | 0.55 |
| Before start main sport | 3.1 (4.0) | 1.4 (2.6) | ** | 0.53 |

Note: * p<0.05; ** p<0.01; d = Cohen's d.

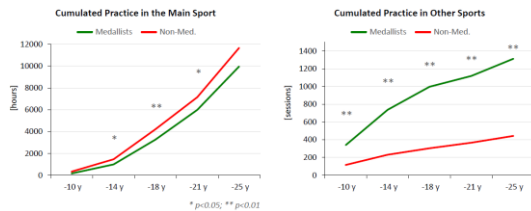
Early Youth Success ≠ Elite Senior Success

International medallists vs. non-medallists

Gülich, 2016

Sample

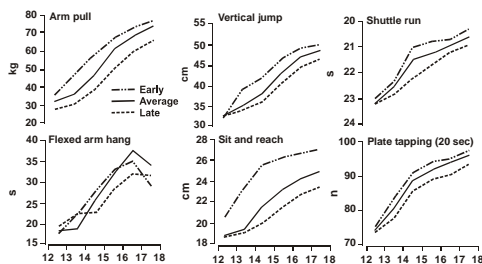
- 83 matched pairs Medallists and non-medallist



Selection Biases for Youth Sports

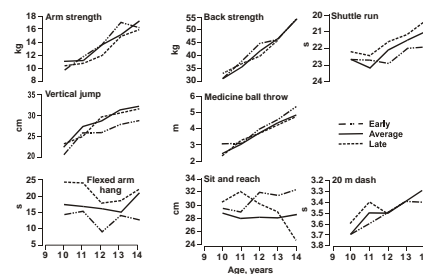
- Selection strategies **favour athletes** on the basis of physical attributes not realised until adulthood
- Physically gifted athletes play to their strengths; **neglecting** technical/tactical development
- Less physically gifted, yet equally talented, athletes **overlooked** or excluded too early

Pubertal Timing and Fitness in Boys



* Malina et al., (2004) Growth Maturation and Physical Activity

Pubertal Timing and Fitness in Girls



* Malina et al., (2004) Growth Maturation and Physical Activity

Assessing Growth & Maturation

- Players regularly assessed for **height, seated height and weight**; heights of bio-parents
- Data used to **calculate maturity status**, maturity timing, growth velocity, age at PHV, future height
- www.bonexpert.com/documentation/adult-height-predictor
Important to note that the equation still has a large variance in the accuracy

Anthropometrics

- Height, weight, (two measures per child)
- Take a 3rd measure if differences between first measures is > .5 (cm./kg.)
- Note time, date of assessment/birth; investigator ID

Guidelines for measuring height

- Shoes off
- Flat feet, heels together
- Stand up tall
- Eyes in Frankfort plane
- Adjust chin if required
- Inhale and hold
- Measure to apex of head
- Record and repeat the measurement

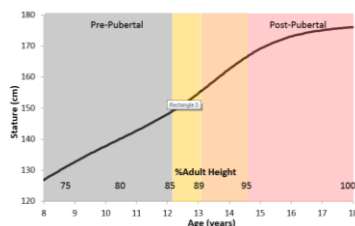


| YOUTH PHYSICAL DEVELOPMENT (YPD) MODEL FOR MALES | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|------------------------------------|---|---|---|---|------------------|---|---|----|----|---|------------------|----|----|----|----------------|------------------------|----|----|-----|---------------------|--|--|--|--|
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| GROWTH RATE | RAPID GROWTH | | | | | STEADY GROWTH | | | | | | ADOLESCENT SPURT | | | | | DECLINE IN GROWTH RATE | | | | | | | | |
| MATURATIONAL STATUS | YEARS PRE-PHV | | | | | | | | | | PHV | | | | | YEARS POST-PHV | | | | | | | | | |
| TRAINING ADAPTATION | PREDOMINANTLY NEURAL (AGE-RELATED) | | | | | | | | | | COMBINATION OF NEURAL AND HORMONAL (MATURITY-RELATED) | | | | | | | | | | | | | | |
| PHYSICAL QUALITIES | FMS | | | | | FMS | | | | | FMS | | | | | FMS | | | | | | | | | |
| | SSS | | | | | SSS | | | | | SSS | | | | | SSS | | | | | | | | | |
| | Mobility | | | | | Mobility | | | | | Mobility | | | | | Mobility | | | | | | | | | |
| | Agility | | | | | Agility | | | | | Agility | | | | | Agility | | | | | | | | | |
| | Speed | | | | | Speed | | | | | Speed | | | | | Speed | | | | | | | | | |
| | Power | | | | | Power | | | | | Power | | | | | Power | | | | | | | | | |
| | Strength | | | | | Strength | | | | | Strength | | | | | Strength | | | | | | | | | |
| | Hypertrophy | | | | | Hypertrophy | | | | | Hypertrophy | | | | | Hypertrophy | | | | | | | | | |
| | Endurance & MC | | | | | Endurance & MC | | | | | Endurance & MC | | | | | Endurance & MC | | | | | | | | | |
| | UNSTRUCTURED | | | | | LOW STRUCTURE | | | | | MODERATE STRUCTURE | | | | | HIGH STRUCTURE | | | | | VERY HIGH STRUCTURE | | | | |

(Lloyd & Oliver, 2012)

Matching Training to Maturational Status

Figure 2. Bio-bands of maturity for an individual male based on cumulative growth and percentage of adult height.



Cumming, Lloyd, Oliver, Eisenmann, Malina (2017) Str Cond J

Matching Training to Maturational Status

~85% PAH

- About to enter the growth spurt; closer monitoring of training load and skills
- Potential to introduce structural adaptation

~89% PAH

- Mid growth spurt; increased risk for epiphyseal injuries
- Can benefit from combined training (neural & structural adaptation)

~99% PAH

- Post-growth spurt; reduced risk for growth related injuries
- Physically ready to engage in more mature training programs

Bio-banding for competition

- Athletes **matched by maturity bands** rather than chronological age
- Optimise **challenge and opportunity** for early and late developers, respectively



Cumming et al. (2017) J Sports Sci



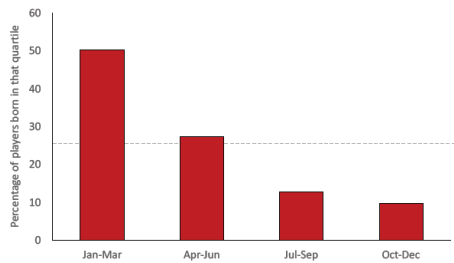
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Relative Age Effect

- Children born towards the start of the year are relatively older than those born later in the selection year.
- Being relatively older can afford a large advantage in terms of:
 - Height
 - Weight
 - Coordination
 - Strength
 - Cognitive development
 - Accumulation of practice volume

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The RAE on PSV juniors



Barnsley, Thompson, & Barnsley, 1985, *J. Canadian Ass. Health, P.E. & Recreation*; Dudink, 1994, *Nature*

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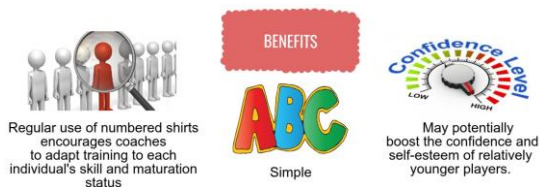
Strategy to overcome RAE



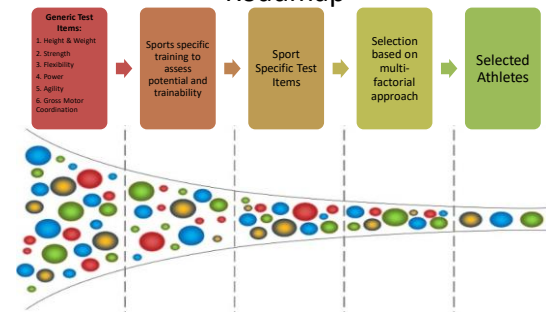
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Athlete Identification & Selection

Roadmap



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Talent Pyramid



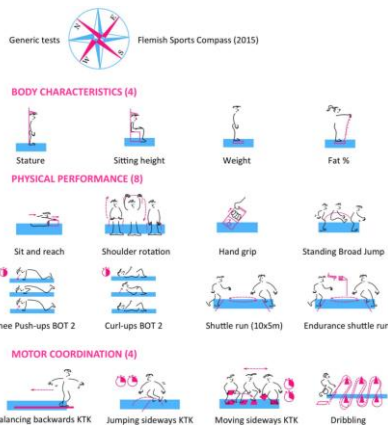
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Local Identification

- Primary 4s in Singapore
 - 6 components
1. Anthropometry
 2. Power
 3. Agility
 4. Speed
 5. Balance and Flexibility
 6. Motor Coordination



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The Körperkoordinations Test für Kinder

4 subtests

1. Jumping sideways with 2 feet in 15 seconds
2. Hopping for height
3. Moving sideways on platforms in 20 seconds
4. Walking backwards 3 times with decreasing width of balance beam each time



- Used it as a part of TiD for triathletes in Belgium
- :The value of a non-sport-specific motor test battery in predicting performance in young female gymnasts

Barbara Vandorpe, Joric B. Vandendriessche, Roel Vaeyens, Johan Pion, Johan Lefevre, Renaat M. Philippaerts & Matthieu Lenoir

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KTK for use of talent identification

- Callewaert, M., Boone, J., Celie, B., De Clercq, D., & Bourgois, J. G. (2014). *Indicators of sailing performance in youth dinghy sailing*. *European Journal of Sport Science*, 15(3), 213-219.
- Pion, J. A., Fransen, J., Deprez, D. N., Segers, V. I., Vaeyens, R., Philippaerts, R. M., Lenoir, M. (2015). *Stature and jumping height are required in female volleyball, but motor coordination is a key factor for future elite success*. *Journal of Strength & Conditioning Research*, 29(6), 1480-1485.

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Talent Pyramid



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Current Identification

Recruitment Report

General Information

- Date of birth, Height, Weight

1. Physical Assessment

2. Psychological Survey

- Grit, Motivation

3. Coaches' Observation (Technical ability)

The form is divided into several sections:

- Personal Information:** Name, Gender, Date of Birth, Age, Height, Weight, BMI.
- Anthropometry:** Measurements for BMI, Balance, and Agility.
- Physical Performance:** Tests for Strength, Endurance, and Agility.
- Psychological Profile:** Grit and Achievement Scale.
- Technical Ability:** Footwork, Quality of Stroke, Timing, Potential, and Skill Ability.

Normative Data for Comparison

Badminton

(Boys & Girls)

- 2004-2016
- 3 stations
 - Beep test
 - Court Agility
 - Vertical Jump

| 2004-2016 (BOYS) | | n | m | SD |
|------------------------------|-------------------|-----|---------|---------|
| Height | cm | 105 | 151.000 | 8.9923 |
| Weight | kg | 93 | 40.6543 | 8.15189 |
| BMI | kg.m ² | 93 | 17.7089 | 2.17276 |
| Beep test (Predicted VO2max) | ml/min/kg | 154 | 41.453 | 5.3894 |
| Court agility | sec | 156 | 12.186 | 1.11438 |
| Vertical jump | cm | 143 | 37.8 | 7.177 |

| 2004-2016 (Girls) | | n | m | SD |
|------------------------------|-------------------|-----|---------|---------|
| Height | cm | 97 | 151.616 | 6.9384 |
| Weight | kg | 79 | 41.0232 | 6.71038 |
| BMI | kg.m ² | 79 | 17.829 | 2.10606 |
| Beep test (Predicted VO2max) | ml/min/kg | 133 | 37.28 | 4.467 |
| Court agility | sec | 129 | 12.8447 | 0.9834 |
| Vertical jump | cm | 124 | 32.52 | 5.442 |

Physical Assessment Components

| Badminton | Football | Table Tennis | Netball | Athletics | Swimming |
|------------------------------------|-------------------|-----------------------|-----------------------|-------------------------|-------------------------------|
| Court Agility | 20m Sprint Test | 3.5m Shuffle Footwork | 10m Sprint Speed Test | 50m Sprint | 3RM Squat |
| Vertical Jump | Vertical Jump | Vertical Jump | Vertical Jump | Vertical Jump | Vertical Jump |
| Yo-Yo Intermittent Recovery 1 Test | Agility 505 | Planking | Agility 505 | 3kg Medicine ball throw | Swim based analysis |
| | Jump Test (Reach) | Shuttlecock Throw | Jump Test (Reach) | 600m Endurance Test | Musculoskeletal screening |
| | | Wall Toss | | | Functional movement screening |

Grit and Achievement Motivation



- Grittier individuals have been found to spend more time on deliberate practice on their craft (Duckworth et al., 2011).

Higher grit scores (1 lowest, 5 highest) indicate greater motivation and perseverance.

| | Approach | Avoidance |
|-------------|--|---|
| Mastery | -task approach-oriented -focused on gaining mastery of tasks (MAp) | -task avoidance-oriented -seeks to avoid failure in task mastery (MAv) |
| Performance | -ego-approach oriented -focused on demonstrating superior competence over others (PAP) | -ego-avoidance oriented -avoids displaying normative incompetence (PAV) |

(Adie et al., 2010)

Ideal score: High MAp and PAP, and low MAV and PAV. Lowest score is 3, highest is 21.

Technical/Coaches' Observation

| Badminton | Netball | Table Tennis |
|-------------------|-------------------------|---------------------------|
| Footwork | Footwork (Attack) | Forehand Rally |
| Quality of Stroke | Ball handling (Attack) | Forehand-Backhand Push |
| Timing | Footwork (Defense) | Structure of basic skills |
| Skill Ability | Ball handling (Defense) | Tactics |
| Potential | Spatial Awareness | |

Observation by: At least 3 internal coaches + 1 external coach

Talent Pyramid



Identification Campaigns

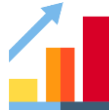
- RBC Training Ground (Canada)
- UK Sport



- Multi-phased talent recruitment and confirmation programmes
- **Phase 1**
 - Range of generic physical and skill-based tests at various testing centres around the UK.
 - Tests may include: sprints, jumps, aerobic fitness, and upper and lower body-strength tests.
 - Also includes an in depth analysis of each athlete's training and competition history.

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UK Sport



- **Phase 2 – 3**
 - further assess an athlete's suitability for a sport
 - better equip athletes
 - athlete's pathway outlined
 - E.g. functional movement screening, medical screening, performance lifestyle workshops and psychology and behavioural assessments.
- **Confirmation Phase**
 - 6 – 12 month
 - rates of progression are tracked to further assess their suitability
 - Unsuccessful athletes are provided with opportunities to continue the sport through the club system.

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TALL & TALENTED



https://www.youtube.com/watch?v=BC2_7dPtTgs

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UK Sport



- **SPORTING GIANTS (2007)**
 - basic criteria of being tall (minimum 190cm for men and 180cm for women), young (between 16 and 25), and with some sort of athletic background.
- **GIRLS4GOLD (2008)**
 - highly competitive sportswomen who can potentially be Olympic champions
 - targeted Olympic sports; skeleton, canoeing, modern pentathlon, rowing and sailing.



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Successful Transfer Athlete

- **Helen Glover – Sporting Giants**
- **Sport:** Rowing (women's pair)
- **Former Sport:** Athletics, Hockey
- London 2012 & Rio 2016 gold medalist in Women's coxless pairs



Retrieved from: <http://www.independent.co.uk/sport/olympics/rio-2016-rowing-helen-glover-lets-to-pay-back-family-and-friends-with-gold-medal-for-olympic-7387136.html>

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RBC Training Ground (Canada)

<https://www.youtube.com/watch?v=XG7V3R3JR7w&t=102s>

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Talent Optimisation

- Who & When?
 - Burn out, reached his/her peak, injury
- What & How?
 - Around 14-16
 - Transfer into sports with similar skill sets
- Why?
 - Senior top athletes emerge as a result of repeated selection, de-selection, and replacements across all age ranges.
 - Allow athletes to extend their sporting careers



44% of all Olympic and senior world champion medallists have changed to compete in another sport

Gulbin A. & Colley S. In Press. On the efficacy of talent identification and talent development programmes. In Baker, J., Colley S., Schorer, J., & Wattie, N. (eds). The Routledge handbook of talent identification and development in sport. Routledge

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Implication for Practitioners



- Early specialisation ↔ Varied experiences
- Early selection ↔ Later selection
- Standardised pathway ↔ Individualised pathway
- **Focus on the selected few ↔ Enlarge the 'talent pool'**



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