Talent Identification and Development in Badminton

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Ghent University (BEL)

6th World Congress of Racket Sport Science
A brief history of sports talent research

"The Big Bang TID"
German Democratic Republic 'State Plan 14-25'
Wolkow (1974)  'Coach Opinion'
Bar-Or (1975) 'Statistics - Regression'
Gimbel (1975) 'Deslected towards recreational sports'
Gabler & Ruoff (1979) 'Performance Predictors'
Bloom (1985) 'Retrospective Study'

Benjamin Bloom (1913-1999)

- Educational Psychologist, authored: Taxonomy of Educational Objectives (1956), All Our Children Learning (1980), Developing Talent in Young People (1985)
- Known for: Bloom’s Taxonomy of Educational Objectives
- Contributed to: Theory of Mastery Learning
Australia 'AIS'
Règnier et al. (1993) 'Sliding Population'
Csikszentmihalyi (1993) 'Prospective Study'
Côté (1999) 'Specialising and Sampling'
Abbott & Collins (2004) 'Multidimensional concept'

Fig. 1. The role of psycho-behaviours in facilitating the successful negotiation of developmental transitions within a multidimensional and dynamic concept of talent.
Gagné (2004) 'Giftedness and Talent'
Balyi & Hamilton (2004) 'LTAD'

Figure 1. Adaptation to training and optimal trainability (adapted from Balyi & Way, 2002; in Balyi & Hamilton, 2004).

*ABC’s – Agility Balance Coordination Speed + RJT = Run Jump Throw + KGB’s = Kinesthesia Girdling Bounce Sticking with object + CK’s = Catching Kicking Sticking with body

**Personal Characteristics**
- Genetics
- Resilience and commitment
- Task orientation and motivation
- Self-efficacy/belief systems

**Abilities/Dispositions**
- Physical
- Cognitive
- Interpersonal
- Intrapersonal
- Creativity

**Access and Opportunity**

**Identification**
- Practice
- Provision

**Access and Opportunity**

**Environmental Characteristics**
- Teachers/coaches
- Peer socialisation
- Family support
- Social values

**Outcomes**
- Lifelong physical activity
- Rewarding physical education experience
- Elite sport performance
- Sport leadership
Great Britain 'UK Sport'
Coté (2007) 'Sports Participation'

**Potential outcomes**
- Recreational participation
- Enhanced physical health
- Enhanced enjoyment

**Potential outcomes**
- Elite performance
- Enhanced physical health
- Enhanced enjoyment

**Potential outcomes**
- Elite performance
- Reduced physical health
- Reduced enjoyment

**Recreational phase**
*Activities:*
- High amount of deliberate play
- Low amount of deliberate practice
- Focus on fitness and health

**Investment phase**
*Activities:*
- High amount of deliberate practice
- Low amount of deliberate play
- Focus on one sport

**Early specialization**
*Activities:*
- High amount of deliberate practice
- Low amount of deliberate play
- Focus on one sport

**Specializing phase**
*Activities:*
- Balanced deliberate play and practice
- Reduced involvement in several sports

**Sampling phase**
*Activities:*
- High amount of deliberate play
- Low amount of deliberate practice
- Participation in several sports

**Entry into sport**
Hohmann (2009) 'High Ability'
Gulbin (2013) 'Performance Development'
Elferink-Gemser & Visscher (2013) 'TID and TDE'

![Diagram of TID and TDE model]

- **CHANCE**
  - Characteristics of sports performance
    - Personal performance characteristics:
      - Anthropometry
      - Physiology
      - Technical skills
      - Tactical skills
      - Psychological skills
    - Environment:
      - Micro, meso, and macro level:
        - Parents, teachers, trainers, coaches, managers, talent development programmes, training facilities, competition

- **TIME**
  - Sports performance

- Self-regulation, Maturation, Learning, Training
Weissensteiner et al. (2016) 'FTEM'
Talent Identification and Development in Badminton

Lessons learned

Starting up a sustainable system for badminton
Detecting (Generic) Sports Potential
Detecting Sports Potential
Detecting Sports Potential
Detecting Sports Potential
Detecting Sports Potential

Online input Internet (WiFi or 4G)

Start new test
Select participant
Manual
Clock
Data input
List of tested participants
Talent Identification and Development in Badminton

Developing (Generic) Sports Potential
Developing (generic) Sports Potential

Rodrigues, Stodden and Lopes
Developmental pathways of change in fitness and motor competence are related to overweight and obesity status at the end of primary school
Journal of Science and Medicine in Sport (2015)
Developing (generic) Sports Potential
Developing (generic) Sports Potential
Developing (generic) Sports Potential
Talent Identification and Development in Badminton

J. Pion

Orienting Sports Potential
Orienting Sports Potential

Sports orientation tool for children between 8 and 10 years old at primary schools and local communities
Orienting Sports Potential

> 20,000 children in primary schools

> 2,000 elite sports schools

> 30,000 participants in clubs
Orienting Sports Potential
Orienting Sports Potential

“Why do you play sports?”

“What are you good at?”

“What do you like?”
Orienting Sports Potential
Orienting Sports Potential

Physical characteristics = Actual performance
Motor coordination = Sports potential
Orienting Sports Potential


Anthropometry:
- Stature
- Sitting height
- Weight
- Fat %

Physical performance:
- Sit and reach
- Shoulder rotation
- Hand grip
- Standing Broad Jump

Motor coordination:
- Balancing backwards KTK
- Jumping sideways KTK
- Moving sideways KTK
- Dribbling

SPORT KOMPAS I DO

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Orienting Sports Potential

Counter movement jump

Badminton
Basketball
Cycling
Fencing
Gymnastics
Handball
Judo
Ski
Soccer
Taekwondo
Table tennis
Tennis
Triathlon
Volleyball

Low
High
Quotiënt

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**Orienting Sports Potential**

<table>
<thead>
<tr>
<th>D.A. correctly classified</th>
<th>Stature</th>
<th>Sitting Height</th>
<th>Weight</th>
<th>Fat%</th>
<th>BMI</th>
<th>Shoulder rotation</th>
<th>Sit and reach</th>
<th>Counter movement jump</th>
<th>Shuttle run 10 x 5m</th>
<th>Sprint 5m</th>
<th>Sprint 30m</th>
<th>Sit ups</th>
<th>Knee Push ups</th>
<th>Standing broad jump</th>
<th>Endurance shuttle run</th>
<th>k TK BB</th>
<th>k TK JS</th>
<th>k TK MS</th>
<th>Dribble run</th>
<th>Dribble Hands</th>
<th>Dribble Feet</th>
<th>Throwing shuttles</th>
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<td>96%</td>
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<td><strong>Basketball</strong></td>
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<td><strong>Gymnastics</strong></td>
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<td><strong>Handball</strong></td>
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<td><strong>Table tennis</strong></td>
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<td><strong>Triathlon</strong></td>
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<td><strong>Volleyball</strong></td>
<td>94%</td>
<td>92%</td>
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**Generic anthropometric and performance characteristics among elite adolescent boys in nine different sports**


6th World Congress of Racket Sport Science
Orienting Sports Potential

European Journal of Sport Science
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/tejs20

Generic anthropometric and performance characteristics among elite adolescent boys in nine different sports
Johan Pion, Veerle Segers, Job Fransen, Gijs Debuyck, Dieter Deprez, Leen Haerens, Roel Vaeyens, Renaat Philippaerts & Matthieu Lenoir
Faculty of Medicine and Health Sciences, Department of Movement and Sports Sciences, Ghent University, Ghent, Belgium
Published online: 21 Aug 2014.
Orienting Sports Potential

D.A. correctly classified

Badminton 96% - 83%

Knee push-ups ($F = 6.041$ and $P = 0.015$),
Sprint 5m ($F = 5.535$ and $P = 0.005$)
Counter movement jump ($F = 5.262$ and $P = 0.002$)
Throwing distance ($F = 31.536$ and $P < 0.001$)

Generic anthropometric and performance characteristics among elite adolescent boys in nine different sports

Normalized scores

Outlyers or Specific Population

P5, P10, P25, P50, P75, P90, P95

Z -1, X, Z +1, Z +2, Z +3, Z +4, Z +5
Development Lines for Stature (Boys - Flanders)
Counter Movement Jump (Badminton Boys)

Age (y.)

6 y
7 y
8 y
9 y
10 y
11 y
12 y
13 y
14 y
15 y
16 y
17 y

Primary schools (6y – 11y)) elite sport schools (12y – 17y)

Sample badminton

6th World Congress of Racket Sport Science
KTK Jumping Sideways (Badminton Boys)

Age (y.)

- 17 y
- 16 y
- 15 y
- 14 y
- 13 y
- 12 y
- 11 y
- 10 y
- 9 y
- 8 y
- 7 y
- 6 y

2x (n/15s.)

Primary schools (6y – 11y)) elite sport schools (12y – 17y)

Sample badminton

6th World Congress of Racket Sport Science
KTK Moving Sideways (Badminton Boys)

Primary schools (6y – 11y)) elite sport schools (12y – 17y)

Sample badminton

6th World Congress of Racket Sport Science
KTK Moving Sideways (Badminton Boys)

Primary schools (6y – 11y) elite sport schools (12y – 17y)
Sample badminton

6th World Congress of Racket Sport Science
Profiling (Individual Scores)

The Normal Distribution

- Probability
- Values

Probability of Cases in portions of the curve
- Standard Deviations From The Mean
- Cumulative %
  - 0.1%
  - 2.3%
  - 15.9%
  - 50%
  - 84.1%
  - 97.7%
  - 99.9%

Z Scores
- -4.0
- -3.0
- -2.0
- -1.0
- 0
- +1.0
- +2.0
- +3.0
- +4.0

MQ Scores
- 55
- 70
- 85
- 100
- 115
- 130
- 145

95% of values
99% of values

Test scores
What is the meaning of a raw score of 1.76 m? When...

When mixed with generic and sport-specific tests, which serve as benchmarks for different populations, and different sports.
Benchmarks

Stature 166 cm

Boy 15y

Fencing: Minder goed 79, Uitstekend
Gymnastics: Minder goed, Uitstekend 109
Triathlon: Minder goed, Uitstekend 90
Volleyball: Minder goed 70, Uitstekend
Badminton: Minder goed, Uitstekend 87

CMJ 33cm

Boy 15y

Fencing: Minder goed, Uitstekend 93
Gymnastics: Minder goed, Uitstekend 94
Triathlon: Minder goed, Uitstekend 112
Volleyball: Minder goed, Uitstekend 78
Badminton: Minder goed, Uitstekend 89
Orienting Sports Potential

**Haenen Nenah**

- **Geboorte:** 2/8/2012
- **Geschacht:** Vrouw
- **Voorkeurshand:** Links
- **Leefoord:** 18,33%
- **Huidige sporten:** Lopen

### Lichaamsomtrekken

<table>
<thead>
<tr>
<th>Lichaamsomtrekken</th>
<th>Mijn lichaam tegenover leeftijdsgenoten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lengte</td>
<td>123,2 cm</td>
</tr>
<tr>
<td>Gewicht</td>
<td>25 kg</td>
</tr>
<tr>
<td>Vetpercentage</td>
<td>18%</td>
</tr>
</tbody>
</table>

### Fysiek

<table>
<thead>
<tr>
<th>Fysiek</th>
<th>Mijn score</th>
<th>Mijn prestatie tv. leeftijdsgenoten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leerlijn onderlichaam</td>
<td>21,9 cm</td>
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</tr>
<tr>
<td>Schouderlengte</td>
<td>72,0 cm</td>
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</tr>
<tr>
<td>Staansnelheid en wendbaarheid</td>
<td>24,85 sec</td>
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</tr>
<tr>
<td>Functionele sprongkraat</td>
<td>11,6 cm</td>
<td></td>
</tr>
<tr>
<td>Explosieve sprongkraat</td>
<td>14,9 cm</td>
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</tr>
<tr>
<td>Kracht uithouding romp</td>
<td>11</td>
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<tr>
<td>Kracht uithouding bovenlichaam</td>
<td>29</td>
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<tr>
<td>Uithoudingsvermogen</td>
<td>4,5 min</td>
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</tbody>
</table>

### Motoriek

<table>
<thead>
<tr>
<th>Motoriek</th>
<th>Mijn score</th>
<th>Mijn prestatie tv. leeftijdsgenoten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamisch evenwicht</td>
<td>27</td>
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<tr>
<td>Snel motoriek</td>
<td>64</td>
<td></td>
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<tr>
<td>Groe motoriek</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Denkvaardigheid</td>
<td>19</td>
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</table>

### SportKompas

- **ATLETIEK** Lopen
- **ATLETIEK** Triatlon
- **WIELRENNEN**
- **VOLLDALE**
- **BOETBAL**
- **BASKETBAL**
- **HANDBAL**
- **TENNIS**
- **TAFELTENNIS**
- **BADMINTON**
- **SKI**
- **SNOWBOARD**
- **KUNSTCHAATSEN**
- **GYMNASTIEK**
- **SCHERMEN**
- **TACWONDO**
- **JUDO**

### Mijn algemene prestatiescores tegenover leeftijdsgenoten

- **Lichaamsomtrekken:** -
- **Kracht:**
- **Leerlijn:**
- **Snelheid:**
- **Motoriek:**
- **Uithouding:**

### Hoe Interpreteren?

Je persoonlijke testscores staan in de kolom 'Mijn score'. Deze scores worden omgezet naar een kleur dat wordt vergeleken met de gemiddelde score van je leeftijdsgenoten. Afhankelijk van de kleur is de interpretatie van je persoonlijke score als volgt:

- Blauw: Minder goed
- Groen: Groot goed
- Oranje: Groot goed
- Rood: Zeer goed

De kleuren geven aan hoe je persoonlijke score tegenover de gemiddelde score ligt. Donker groen geeft een zeer goede score weer en oranje staat voor een minder goede score.
All children
Orienting Sports Potential
SportKompas

I Like

Travel with Sporti to space and discover your favorite sport planets.

Start your space adventure! >
Orienting Sports Potential

Hi, I'm Sporti. I live on a planet nearby! Today, I'm your personal travel guide! I will take you to your preferred sport planets.
Orienting Sports Potential
Orienting Sports Potential
Orienting Sports Potential
Orienting Sports Potential

Got it! This space suit will fit you perfectly. Let's go!
Orienting Sports Potential
Welcome to the sports universe! I've handpicked these seven sport planets for you. The larger the planet, the better the match.

- Football
- Athletics Fond
- Cycling
- Table Tennis
- Korfbal
- Rugby
- Volleyball

Show all >
Talent Identification and Development in Badminton

Specialising or Sampling
Talent Identification and Development in Badminton

Specialising or Sampling

SportKompas I NEED (coaches' survey)

Specialising

Sampling
Talent Identification and Development in Badminton

A coaches’ perspective on the contribution of anthropometry, physical performance, and motor coordination in racquet sports

Kamasha Robertson, Johan Pion, Mireille Mostaert, Mohd Rozilee Wazir Norjali Wazir, Tamara Kramer, Irene Renate Faber, Pieter Vansteenkiste & Matthieu Lenoir

Canonical Discriminant Functions
THE MATRIX
Talent Identification and Development in Badminton

- Balance
- Flexibility
- Core Stability
- Climbing
- Pull Strength
- Catching
- Rythm
- Hitting
- Individual / Team
- Small / Tall
- Velocity (Speed)
- Endurance
- Jumping
- Agility Run
- Throwing
- Kicking
- Swimming
- Indoor / Outdoor
- Contact / No Contact

100
Talent Identification and Development in Badminton

Balance
Flexibility
Core Stability
Climbing
Pull Strength
Catching
Rhythm
Hitting
Individual / Team
Small / Tall

Velocity (Speed)
Endurance
Jumping
Agility Run
Throwing
Kicking
Swimming
Indoor / Outdoor
Contact / No Contact

93 100 93
# Talent Identification and Development in Badminton

<table>
<thead>
<tr>
<th>Category</th>
<th>Velocity (Speed)</th>
<th>Endurance</th>
<th>Jumping</th>
<th>Agility Run</th>
<th>Throwing</th>
<th>Kicking</th>
<th>Swimming</th>
<th>Indoor / Outdoor</th>
<th>Contact / No Contact</th>
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<tbody>
<tr>
<td>Balance</td>
<td>82</td>
<td>93</td>
<td>100</td>
<td>93</td>
<td>85</td>
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<td>Flexibility</td>
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6th World Congress of Racket Sport Science
Talent Identification and Development in Badminton

Balance
Flexibility
Core Stability
Climbing
Pull Strength
Catching
Rhythm
Hitting
Individual / Team
Small / Tall

Velocity (Speed)
Endurance
Jumping
Agility Run
Throwing
Kicking
Swimming
Indoor / Outdoor
Contact / No Contact

81 82 93 100 93 85 82
Talent Identification and Development in Badminton

- Balance
- Flexibility
- Core Stability
- Climbing
- Pull Strength
- Catching
- Rythm
- Hitting
- Individual / Team
- Small / Tall

- Velocity (Speed)
- Endurance
- Jumping
- Agility Run
- Throwing
- Kicking
- Swimming
- Indoor / Outdoor
- Contact / No Contact

Scores:

- Balance: [63, 81, 82, 93, 100, 93, 85, 82, 59]
Talent Identification and Development in Badminton

- Specialising
- Broader Specialisation
- Directed Sampling
- Sampling
Identifying Sports Potential

Sports specific talent identification tool for children at sports clubs
Identifying Sports Potential
The value of a non-sport-specific motor test battery in predicting performance in young female gymnasts

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a Department of Movement and Sport Sciences, Faculty of Medicine and Health Sciences, Ghent University, Ghent, Belgium
b Department of Biomedical Kinesiology, Faculty of Kinesiology and Rehabilitation Sciences, KU Leuven, Leuven, Belgium
Predicting Sporting Elite

Gymnastics

**Generic tests**

- Anthropometry
  - Stature
  - Sitting height
  - Weight
  - Fat %

- Physical performance
  - Sit and reach
  - Shoulder rotation
  - Hand grip
  - Standing Broad Jump

- Motor coordination
  - Knee Push-ups BOT 2
  - Curl-ups BOT 2
  - Shuttle run (10x5m)
  - Endurance shuttle run

- Sport specific female gymnastics
  - Balancing backwards KTK
  - Jumping sideways KTK
  - Moving sideways KTK
  - Dribbling

**Sport specific tests**

- Hopping for height KTK
- Rope skipping
- Tanner Index
- 20m Sprint
- Counter movement jump (hips)
- Leg Lifts
- rope climbing

6th World Congress of Racket Sport Science
Predicting Sporting Elite

### Gymnastics Talent Identification W.A.G.

<table>
<thead>
<tr>
<th>Name</th>
<th>Gender</th>
<th>Age</th>
<th>Turnclub Varesta</th>
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#### Anthropometry

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#### Motor Coordination

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#### Technical Observations

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</tbody>
</table>

### Selection

[Coach | Scientists | Decision]
Predicting Sporting Elite

Talent in Female Gymnastics: a Survival Analysis Based upon Performance Characteristics


Authors  J. Plon, M. Lenoir, B. Vandorpe, V. Segers
Affiliation  Ghent University, Movement and Sports Sciences, Ghent, Belgium
Predicting Sporting Elite

Talent Development
Talent Selection
Talent Identification
Gymnastics (WAG)

Baseline: 243
5y later: 35

Talent in female gymnastics: a survival analysis based upon performance characteristics
Pion J, Lenoir M, Vandorpe B, Segers V
Predicting Sporting Elite

Talent Development
Talent Selection
Talent Identification
Gymnastics (WAG)

Sprint 20m
Drop Out Ratio
67.6%

< 3.90 s.
> 4.28 s.

Talent in female gymnastics: a survival analysis based upon performance characteristics
Pion J, Lenoir M, Vandorpe B, Segers V
Predictive models reduce talent development costs in female gymnastics

Johan Pion, Andreas Hohmann, Tianbiao Liu, Matthieu Lenoir & Veerle Segers
# Predicting Sporting Elite

## Gymnastics Talent Identification W.A.G.

<table>
<thead>
<tr>
<th>Name</th>
<th>Gender</th>
<th>Age</th>
<th>Corpus Sano Morsels</th>
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### Anthropometry

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<th>Mean -1Z</th>
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### Physical Performance

<table>
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<tr>
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### Motor Coordination

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<th>Mean</th>
<th>Mean -1Z</th>
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### Technical Observations

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6th World Congress of Racket Sport Science
Talent Identification and Development in Badminton

Generic tests

Flemish Sports Compass (2015)

Anthropometry

Stature
Sitting height
Weight
Fat %

Physical performance

Sit and reach
Shoulder rotation
Standing Broad Jump

Knee Push-ups BOT 2
Curl-ups BOT 2
Shuttle run (10x5m)
Endurance shuttle run

Motor coordination

Balancing backwards KTK
Jumping sideways KTK
Moving sideways KTK
Dribbling
Talent Identification and Development in Badminton

Shuttle Throw

Sprint 5m / 30m

CM Jump
Talent Identification and Development in Badminton

Growth and Maturation
Talent Identification and Development in Badminton

Stature (APHV 6 months earlier)

- 17y
- 16y
- 15y
- 14y
- 13y
- 12y

- 140 cm
- 150 cm
- 160 cm
- 170 cm
- 180 cm
Talent Identification and Development in Badminton

Stature (APHV 6 months later)

- 17y
- 16y
- 15y
- 14y
- 13y
- 12y

Height:
- 140 cm
- 150 cm
- 160 cm
- 170 cm
- 180 cm

6th World Congress of Racket Sport Science
Talent Identification and Development in Badminton

Sprint 30m (APHV 6 months later)

17y

16y

15y

14y

13y

12y

140 cm

4,100 s.

4,500 s.

4,900 s.

5,300 s.
Talent Identification and Development in Badminton

KTK Moving Sideways (APHV 6 months later)

17y

16y

15y

14y

13y

12y

50x / 2x20 sec

60x / 2x20 sec

70x / 2x20 sec

80x / 2x20 sec

6th World Congress of Racket Sport Science
Talent Identification and Development in Badminton

Dribble feet (APHV 6 months later)

17y
16y
15y
14y
13y
12y

16,00 sec 18,00 sec 20,00 sec 22,00 sec

6th World Congress of Racket Sport Science
Bio-banding in Sport: Applications to Competition, Talent Identification, and Strength and Conditioning of Youth Athletes

Sean P. Cumming, PhD,1 Rhodri S. Lloyd, PhD,2,3 Jon L. Oliver, PhD,2,3 Joey C. Eisenmann, PhD,4 and Robert M. Malina, PhD5,6
1Department for Health, University of Bath, Bath, United Kingdom; 2Youth Physical Development Centre, Cardiff Metropolitan University, Cardiff, United Kingdom; 3Sports Performance Research Institute New Zealand, Auckland University of Technology, Auckland, New Zealand; 4College of Osteopathic Medicine, Michigan State University, East Lansing, Michigan; 5Department of Kinesiology and Health Education, University of Texas, Austin, Texas; and 6Tarleton State University, Stephenville, Texas
Bio-bands of maturity for an individual male based on cumulative growth and percentage of adult height (Cumming et al 2017).
Talent Identification and Development in Badminton

**Anthropometry**

<table>
<thead>
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<th>Lowest</th>
<th>-1 Z</th>
<th>Mean</th>
<th>+1 Z</th>
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**Growth prediction**

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<tbody>
<tr>
<td>Maturity offset (Mirwald et al, 2002)</td>
<td>-0,4</td>
</tr>
<tr>
<td>APHV (Mirwald et al, 2002)</td>
<td>13,9</td>
</tr>
<tr>
<td>Growth prediction (Sherar et al 2005)</td>
<td>173,9</td>
</tr>
<tr>
<td>Growth prediction (curve)</td>
<td>182,0</td>
</tr>
<tr>
<td>Grow potential (curve)</td>
<td>16,3</td>
</tr>
<tr>
<td>% Adult height (curve)</td>
<td></td>
</tr>
</tbody>
</table>

Bio-bands of maturity for an individual male based on cumulative growth and percentage of adult height (Cumming et al 2017).
# Talent Identification and Development in Badminton

## Anthropometry

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Lowest</th>
<th>-1 Z</th>
<th>mean</th>
<th>+1 Z</th>
<th>highest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stature</strong></td>
<td>155.3</td>
<td>155.5</td>
<td>155.2</td>
<td>165.9</td>
<td>170.7</td>
</tr>
<tr>
<td><strong>Body weight</strong></td>
<td>38.4</td>
<td>38.4</td>
<td>38.2</td>
<td>48.3</td>
<td>56.9</td>
</tr>
<tr>
<td><strong>Sitting height</strong></td>
<td>78.4</td>
<td>78.4</td>
<td>77.7</td>
<td>84.8</td>
<td>91.0</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td>15.92</td>
<td>15.9</td>
<td>16.0</td>
<td>17.4</td>
<td>18.8</td>
</tr>
</tbody>
</table>

## Growth prediction

<table>
<thead>
<tr>
<th>Measurement</th>
<th>-1 Z</th>
<th>mean</th>
<th>+1 Z</th>
<th>highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maturity offset</td>
<td>-1.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>APHV</td>
<td>14.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth prediction</td>
<td>166.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth prediction (curve)</td>
<td>178.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grow potential (curve)</td>
<td>23.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% adult height (curve)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Physical performance tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Lowest</th>
<th>-1 Z</th>
<th>mean</th>
<th>+1 Z</th>
<th>highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sit and reach (cm)</td>
<td>26</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>Sprint 5m (s)</td>
<td>1,116</td>
<td>1,207</td>
<td>1,215</td>
<td>1,148</td>
<td>1,081</td>
</tr>
<tr>
<td>Sprint 30m (s)</td>
<td>4.88</td>
<td>5.04</td>
<td>5.11</td>
<td>4.783</td>
<td>4.41</td>
</tr>
<tr>
<td>Counter Movement Jump (cm)</td>
<td>24.5</td>
<td>24.5</td>
<td>24.7</td>
<td>31.4</td>
<td>38.2</td>
</tr>
<tr>
<td>Standing Broad Jump (cm)</td>
<td>172</td>
<td>172</td>
<td>169</td>
<td>196</td>
<td>223</td>
</tr>
<tr>
<td>Endurance Shuttle Run (min)</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
</tbody>
</table>

## Coordination tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Lowest</th>
<th>-1 Z</th>
<th>mean</th>
<th>+1 Z</th>
<th>highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance beam KTK 6 - 4.5 - 3</td>
<td>59</td>
<td>59</td>
<td>58</td>
<td>62</td>
<td>66</td>
</tr>
<tr>
<td>Jumping sideways KTK</td>
<td>96</td>
<td>97</td>
<td>97</td>
<td>95</td>
<td>98</td>
</tr>
<tr>
<td>Moving sideways KTK</td>
<td>63</td>
<td>63</td>
<td>63</td>
<td>68</td>
<td>73</td>
</tr>
</tbody>
</table>

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6th World Congress of Racket Sport Science
Talent Identification and Development in Badminton
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Future Projects
Talent Identification and Development in Badminton
Thank you