RELATIVE HANDGRIP STRENGTH IS A BETTER INDICATOR THAN ABSOLUTE HANDGRIP STRENGTH FOR THE ASSESSMENT OF HEALTH-RELATED MUSCULOSKELETAL FITNESS IN CHILDREN

ECSS Virtual Congress 2021

STEFAN KOLIMECHKOV[1]
LUBOMIR PETROV[2]

[1]STK Sport, United Kingdom [2]National Sports Academy, Bulgaria

Aim of the Study

The purpose of this study was to investigate whether relative handgrip strength in children provides a better assessment than absolute handgrip strength for the evaluation of health-related musculoskeletal fitness.

Methods

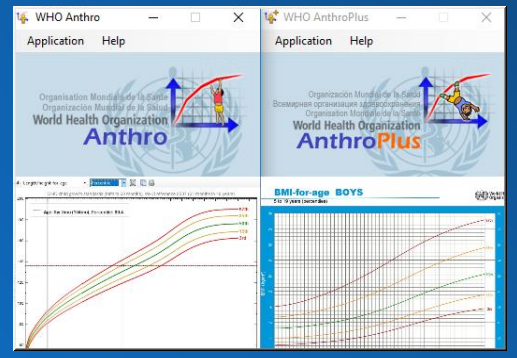
Participants:

62 school children (32 boys and 30 girls) from the UK.

- **15 'healthy boys'** (mean age = 8.4 years)
- **17 'overweight & obese boys'** (mean age = 8.8 years)
- **15 'healthy girls'** (mean age = 8.8 years)
- **15 'overweight & obese girls'** (mean age = 9.2 years)

Body Composition

Height, weight, waist circumference, triceps and subscapular skinfolds (Body fat %)



Assessment

based on the BMI's percentile score:

Healthy < 85

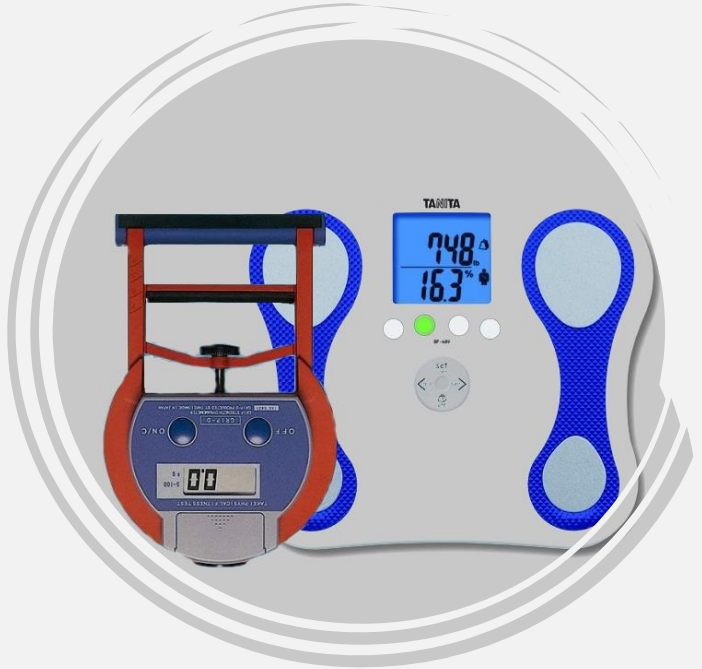
Overweight or Obese > 85

METHODS

ALPHA-FIT TEST BATTERY

Assessing Levels of Physical Activity

Handgrip strength (HGS)
Standing long jump
4x10m shuttle run
20m shuttle run

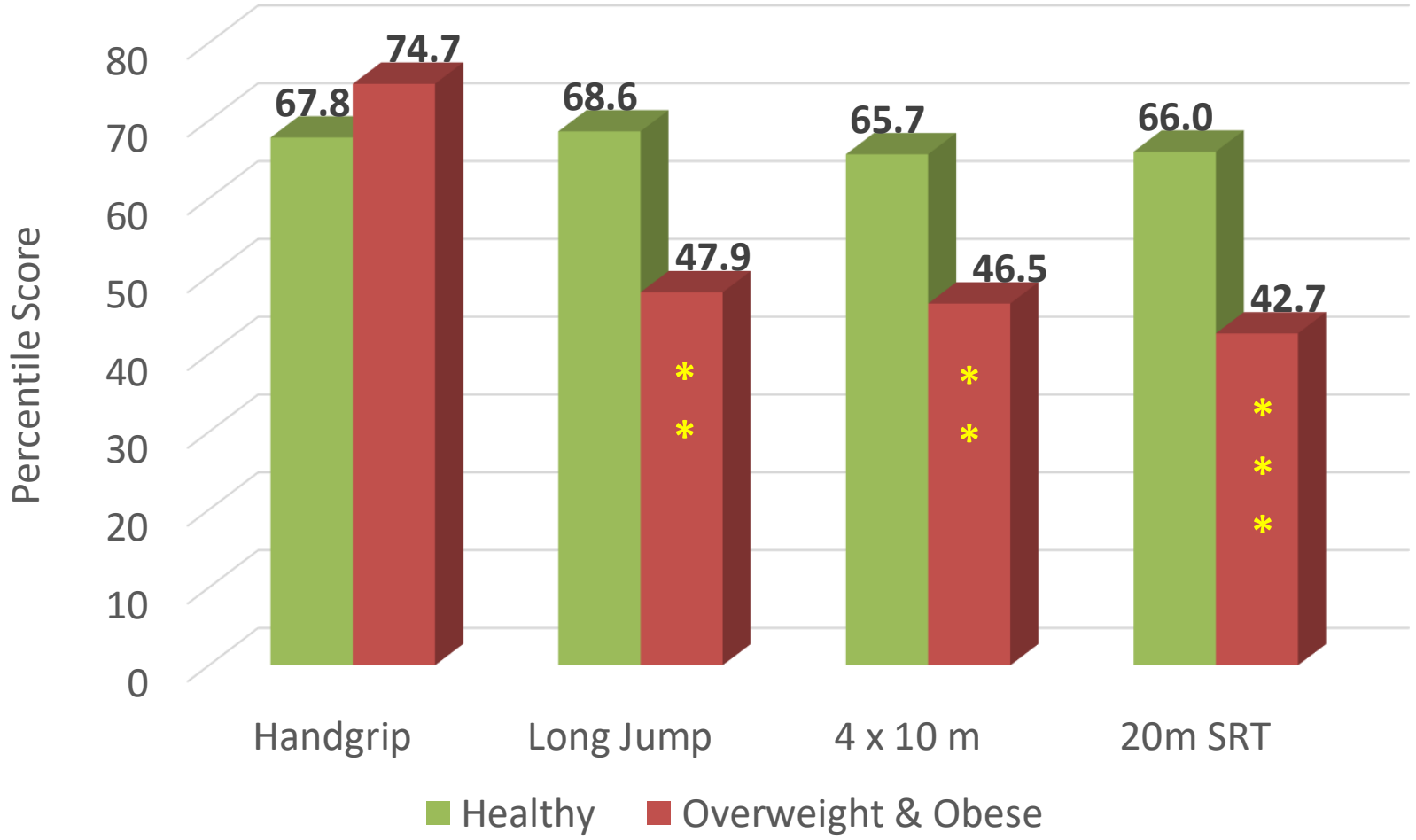


Relative handgrip strength (kg/kg body weight)

Relative HGS was calculated as:

Mean absolute HGS (from both hands) divided by body weight

Results & Discussion



0.51 ± 0.1

vs

0.40 ± 0.1

kg/kg BW

($p < 0.001$)

Percentile scores from the health-related physical fitness tests of all the school children ('healthy', n=30; 'overweight and obese', n=32)

Results & Discussion

	Healthy Girls (n=15)	Overweight & Obese Girls (n=15)
Age (years)	8.81 ± 0.51	9.20 ± 0.38*
Weight (kg)	30.17 ± 4.78	43.99 ± 8.74***
percentile score	**62.06** ± 27.76	**94.27** ± 9.78***
BMI (kg/m^2)	15.95 ± 1.27	21.83 ± 2.84***
percentile score	**47.21** ± 21.66	**94.97** ± 4.89***
Waist-to-height ratio	0.42 ± 0.02	0.50 ± 0.04***
%Body Fat	17.09 ± 3.18	27.60 ± 2.69***
percentile score	**16.20** ± 21.88	**84.31** ± 11.07***

	Healthy Girls (n=15)	Overweight & Obese Girls (n=15)
Handgrip strength (kg)	15.68 ± 3.79	17.17 ± 3.20
percentile score	**74.03** ± 26.75	**82.28** ± 22.12
Relative handgrip strength (kg/kg body weight)	0.52 ± 0.09	0.39 ± 0.05***
Standing long jump (cm)	130.30 ± 22.35	122.87 ± 19.09
percentile score	**67.43** ± 28.60	**53.95** ± 30.42
4x10 m SRT (sec)	13.53 ± 1.31	13.95 ± 1.14
percentile score	**62.11** ± 25.35	**47.99** ± 28.13
VO_2max (ml/kg/min)	47.24 ± 1.68	44.65 ± 1.80***
percentile score	**67.95** ± 16.24	**41.63** ± 19.05**

*p<0.05 vs Healthy Girls; **p<0.01 vs Healthy Girls; ***p<0.001 vs Healthy Girls

Results & Discussion

	Healthy Boys (n=15)	Overweight & Obese Boys (n=17)
Age (years)	8.42 ± 0.88	8.79 ± 0.51
Weight (kg)	28.87 ± 4.40	39.46 ± 6.04***
percentile score	**64.57** ± 21.94	**95.39** ± 5.68***
BMI (kg/m^2)	16.00 ± 1.14	20.94 ± 2.21***
percentile score	**51.53** ± 25.14	**96.73** ± 3.29***
Waist-to-height ratio	0.44 ± 0.03	0.50 ± 0.04***
%Body Fat	14.38 ± 3.84	26.40 ± 7.25***
percentile score	**22.13** ± 31.15	**83.91** ± 25.38***

	Healthy Boys (n=15)	Overweight & Obese Boys (n=17)
Handgrip strength (kg)	14.41 ± 3.51	16.26 ± 4.14
percentile score	**61.61** ± 23.56	**68.05** ± 28.90
Relative handgrip strength (kg/kg body weight)	0.50 ± 0.08	0.41 ± 0.09*
Standing long jump (cm)	137.07 ± 18.84	123.53 ± 24.83
percentile score	**69.77** ± 21.94	**42.61** ± 31.13**
4x10 m SRT (sec)	12.79 ± 0.84	13.51 ± 1.15
percentile score	**69.23** ± 17.50	**45.15** ± 26.05**
VO_2max (ml/kg/min)	49.13 ± 3.01	46.44 ± 2.72*
percentile score	**64.06** ± 21.89	**43.55** ± 21.29*

*p<0.05 vs Healthy Boys; **p<0.01 vs Healthy Boys; ***p<0.001 vs Healthy Boys

Conclusions

The **relative handgrip strength** is a **better indicator** than the absolute handgrip strength for assessing the health-related musculoskeletal fitness in children.

Future research should establish percentile scores for the relative values of the handgrip strength test in children in order to accurately assess their health-related muscular strength.

THANK YOU

Stefan Kolimechkov PhD
@kolimechkov
www.stk-sport.co.uk
dr.stefan.kolimechkov@gmail.com