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SPORT INSTITUTE OF FINLAND, VIERUMÄKI

COMPARISON OF 20M AND 10M SHUTTLE RUN TESTS FOR THE ASSESSMENT OF AEROBIC FITNESS IN ADOLESCENT MALE HOCKEY PLAYERS

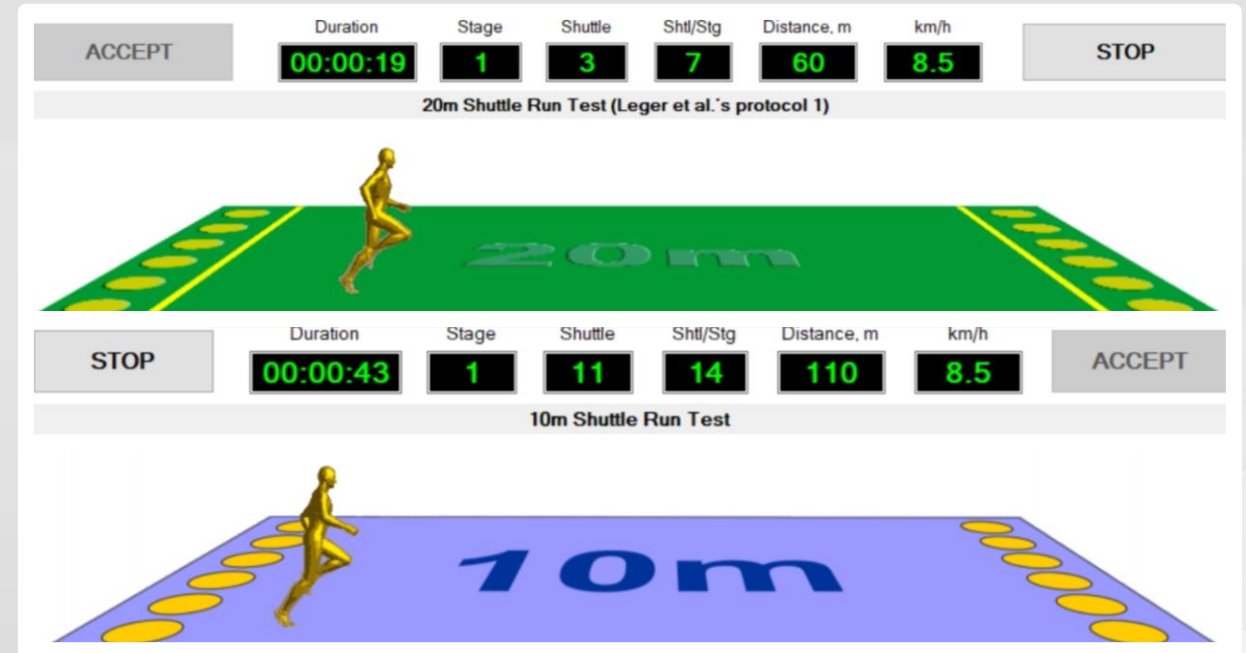


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AIM OF THE STUDY

The aim of this study was to compare the 20m and 10m Shuttle Run Tests (SRT) for the assessment of aerobic fitness in adolescent male hockey players.





METHODS

Participants

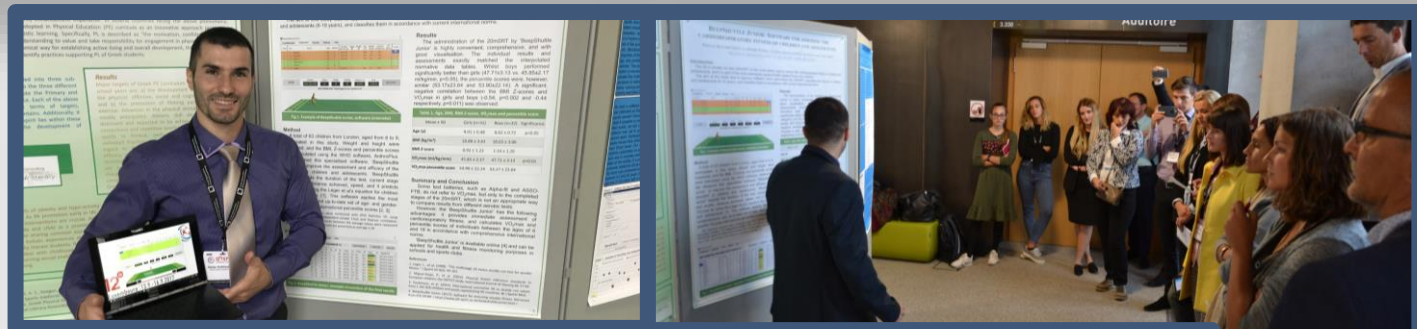
41 junior hockey players from Bulgaria (13.6 ± 1.1 yrs.)

- Height and weight were measured.
- All participants were tested with the 20m BeepShuttle Junior software and the 10m Beep Test software.
- Both software calculated predicted $VO_2\max$ based on the Leger's equation, and percentile scores based on international norms.





BeepShuttle Junior



BeepShuttle Junior V3.0

TeamManager TestControl Results Settings Help

Track	No.	Name	Age	Gender	Duration [h:mm:ss]	Stage [#]	Shuttle [#]	Dist. [m]	Speed [km/h]	VO2max [ml/kg/min]	HR [bpm]	Finish
1	1	Test Name 1	8.0	M								<input type="checkbox"/>
2	3	Test Name 3	10.0	M								<input type="checkbox"/>
3	4	Test Name 4	10.0	M	00:02:28	3	4	380	9.5	44.8		<input checked="" type="checkbox"/>

STOP

Duration: 00:08:26 Stage: 9 Shuttle: 1 Sht/Stg: 11 Distance, m: 1460 km/h: 12.5

20m Shuttle Run Test (Leger et al.'s protocol 1)

Turn

BeepShuttle Junior: Software for the Administration of the 20m Shuttle Run Test in Children and Adolescents

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ABSTRACT

The 20m shuttle run test (20mSRT) is applied for assessing cardiorespiratory fitness, and is included in many fitness test batteries, such as Eurofit, Alpha-fit, FitnessGram, etc.

The aim of this study was to validate software, specially designed by us (BeepShuttle Junior), which administers the 20mSRT, calculates the maximal oxygen uptake (VO₂max) in children and adolescents from 6 to 17 years of age, and classifies them in accordance with comprehensive gender- and age-specific international norms. This software supports the administration of the 20mSRT with an appropriate animation and audio signals. The most recent VO₂max reference standards were combined in order to assess cardiorespiratory fitness. The results can be exported in an Excel compatible CSV file for additional analyses.

A total of 63 children (31 girls and 32 boys) from London, aged from 6 to 9, were tested with the BeepShuttle Junior software, which calculated VO₂max and percentile scores for each child.

The boys performed significantly better than girls in cardiorespiratory fitness (47.7 ± 3.1 vs 45.9 ± 2.2 ml/kg/min respectively, $p < 0.05$), but the mean percentile scores for boys and girls were similar (53.2 ± 23.6 and 53.9 ± 22.1 respectively).

This software computes the percentile score for the exact age (years, months) and the exact VO₂max of each participant by linear interpolation. The individual results and assessments completely matched the interpolated normative data tables.

Key words: 20m shuttle run test, cardiorespiratory fitness, maximal oxygen uptake, children and adolescents, beep test.

Introduction

Cardiorespiratory fitness is one of the most important components of physical fitness, and refers to the ability of the circulatory and respiratory systems to supply enough oxygen for working muscles during sustained physical activity [1]. From the health perspective, a good level of cardiorespiratory fitness has been shown to reduce clinical risk factors for cardiovascular disease and metabolic syndrome in children and adolescents [2]. A systematic review, which includes numerous longitudinal studies [3], provides strong pieces of evidence that a higher level of cardiorespiratory fitness, both in childhood and adolescence, is associated with a healthier cardiovascular profile and with a lower risk of developing cardiovascular diseases later in adulthood. Although many terms have been used in the literature to describe this component of physical fitness, e.g. cardiorespiratory fitness, cardiorespiratory endurance, aerobic fitness, maximal aerobic power, aerobic work capacity, and physical work capacity, they are all applied interchangeably for practical purposes [2].

The most valid measure of cardiorespiratory fitness is the maximal oxygen uptake (VO₂max), which reflects

[Kolimechkov, S., Petrov, L., Alexandrova, A., & Cholakov, K. (2018). BeepShuttle Junior: Software for the administration of the 20m shuttle run test in children and adolescents. Journal of Advanced Sport Technology, 1 (3), 35-40.]



10m Beep Test software

Track	No:	Name	Age	Gender	Duration [hh:mm:ss]	Stage [#]	Shuttle [#]	Dist. [m]	Speed [km/h]	VO2max [ml/kg/min]	HR [bpm]	Finish
1	1	George	10.5	M								<input type="checkbox"/>
2	5	Sofia	17.0	F								<input type="checkbox"/>

STOP	Duration	Stage	Shuttle	Sht/Stg	Distance, m	km/h	ACCEPT
	00:00:43	1	11	14	110	8.5	

10m Shuttle Run Test

- **Original 1-minute protocol, (8.5 km/h + 0.5 km/h / minute).**

Leger, L.A., et al., The multistage 20 metre shuttle run test for aerobic fitness. J Sports Sci, 1988; 6(2)

- **Provides a good visualization of the 10mSRT by using an appropriate animation, and it renders customized audio signals in its settings section.**

- **CSV Excel compatible files / Windows**



RESULTS

Table 1. Age, height, weight and aerobic parameters (mean \pm SD)

	20m SRT	10m SRT
Age (years)	13.6 \pm 1.06	
Height (cm)	161.3 \pm 11.9	
Weight (kg)	56.3 \pm 13.5	
VO₂max	53.2 \pm 5.46 ***	46.4 \pm 4.49
VO₂max Percentile Score	83.9 \pm 20.41 ***	57.8 \pm 23.80

*** – p < 0.001 vs 10m SRT



CONCLUSIONS

- **Testing participants with specialised software which provides good audio-visual animation was highly convenient and comprehensive.**
- **The adapted 10m SRT is a useful alternative for schools and clubs with smaller gymnasiums. However, the calculation of VO_2max should be adjusted in order to accurately predict the actual values.**

THANK YOU



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