



Original article

## Running Speed and Agility according to Bruininks Oseretsky Test of Motor Proficiency, 2<sup>nd</sup> edition

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### ABSTRACT

**Introduction:** Evaluation of running speed and agility in school going children of age 5 to 15 years. Running speed and agility (RSA) is essential in children like other factors like strength, endurance and power. The purpose of this study was to find out the total scores in children, to compare according to gender and to find the descriptive category according to age group. **Materials and methods:** It was a cross sectional analytical study conducted in schools of Pimpri Chinchwad area. This study included 248 males and 268 females which were assessed for by shuttle run test and hopping. **Result:** The total mean point score of female is 30.16 and male are 32.63. The performance of males was better than females. **Conclusion:** From the study, it is concluded that maximum number of students comes under average category and males showed better performance than females in Running speed and agility.

**KEYWORDS:** Running speed & agility, Bruininks Oseretsky Test of Motor Proficiency, 2<sup>nd</sup> edition.

### INTRODUCTION

Running speed and agility is very essential component for children and athlete to develop. Agility refers to the ability of an individual to move or change the direction rapidly and easily. By working on agility, an athlete can be able to move quickly while maintaining control [1]. Speed is the maximal velocity at which a player can sprint [2]. In field sport athletes it is accepted that they have different running mechanics than sprint athletes [3]. The capacity to move swiftly both laterally and linearly is important if an athlete hopes to be competitive in any sport. Stride frequency, stride length and speed and endurance they all affect running speed [4].

By increasing the stride frequency the amount of time required in between the steps can be reduced easily. To improve stride frequency sprint assisted training is necessary as it enables the individual to run with increased speed e.g. Downhill running towing are two examples of sprint assisted training that will help in increasing the stride

frequency. A speed or agility ladder is efficient for improving linear speed, agility and quickness [5]. As the performance of the individual improves, difficulty level should be increased by using more than one ladder as well as by including other different movement patterns.

Age plays key role in running speed and agility. It usually occurs between 18 to 24 months [6]. RSA allows a person to be involved in sports participation and it will aid body movements for physical skills [7]. RSA deficits will be seen in observations of poor coordination of body, failure to develop preferred leg and mostly right or left confusion. Impaired RSA is observed in children having Developmental Coordination Disorder (DCD), Learning Disabilities, Sensory Integrative Dysfunction and other motor impairments [8].

The *Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2)* is a test which includes engaging, goal-directed activities to measure the motor skills in children ages 4 through 21. The Bruininks-Oseretsky Test of Motor Proficiency – BOTMP, (Bruininks, 1978) contains 46 items

grouped under eight different subtests of motor proficiency mainly for children between 4.5 and 14.5 years of age.

The Running speed and agility subtest of BOTMP is the sixth subtest under gross motor composite. Activities in this subtest include a shuttle run test, hopping on one and both the feet and stepping over a balance beam. Performance on the shuttle run is measured in seconds; this item provides the opportunity to make clinical observation about gait pattern.

Therefore, the purpose of this study was (a) To find total point score and descriptive category according to gender in school children (b) To find Descriptive category according to age groups which will be helpful in finding well below average and below average children in running speed and agility.

## MATERIALS AND METHODS

This cross sectional analytical study was conducted in Pimpri Chinchwad area of age group 5 to 15 years. Total 516 samples were studied out of which 248 were males and 268 were females.

The subjects were divided according to gender and age groups. Age group 1 includes 5.0 to 7.11, age group 2 includes 8.0 to 9.11, age group 3 includes 10.0 to 11.11, age group 4 includes 12.0 to 13.11 and age group 5 includes 14.0 to 15.11. The samples were normal and healthy school going children. Inclusion criteria were normal and healthy school going children. Exclusion criteria were any neurological trauma like spinal fractures (6 months back), any visual problem, or any congenital defect.

**Procedure:** The study was approved by the institutional Ethical committee of Dr. D. Y. Patil College of Physiotherapy, Pune. The study was to assess the Running speed and agility in 5-15 years school going children. 516 Subjects of age group 5-15 years were selected in the study fulfilling the inclusion criteria. After explaining the purpose of the study to the subject, written informed consent was taken from the parents prior to the assessment. The subject was selected on the basis of multistage sampling method. In the first stage, 3 English schools and 3 Marathi schools were selected randomly out of total schools in Pimpri Chinchwad Area. In the second stage, from each standard, 1 division was selected randomly. In the third stage, from every division, boys and girls of the same age were selected by random sampling method.

A pre- assessment was taken to record their socio demographic data and other parameters. Every child was asked to perform 5 tasks given in Running speed and agility subtest of BOT-2 scale as follows:

## RESULTS

516 samples were taken out of which 248 were males and 268 were females. The data summary of running speed and agility total point score according to gender is shown in table 1. The mean score of female were  $30.15 \pm 5.52$  and males were  $32.63 \pm 6.48$ . The statistical results for score wise comparison of gender indicated a significant difference

1. Shuttle run test: In this task, 50 ft distance was marked and the shuttle block was placed on the end line. The examinee ran to the end line, picked up the block & runs back to the start line. The second trial was conducted if the examinee stumbles, falls, or drops the block before crossing the start line. The number of seconds that the examinee has taken was recorded.
2. Stepping sideways over a balance beam: In this task, the examinee had stood with feet together next to balance beam with hands on hips. The examinee has to step over the beam, one foot at a time & steps back to the original side. The second trial was conducted if the examinee stumbles or falls during the first trial. The number of correct steps performed in 15 seconds was recorded. A step was incorrect if the examinee fails to keep both the hands on hips. The task was stopped if the examinee stumbles or falls and the second trial were conducted.
3. One legged stationary hop: In this task, the examinee stood with feet together on the end line with hands on hips. The examinee has to raise non preferred leg behind him or her with knee bent 90 degrees & shin parallel to the floor. The examinee hopped up and down on the preferred leg. The second trial was conducted if the examinee stumbles or falls during the first trial. The number of correct hops performed in 15 seconds was recorded.
4. One legged side hop: In this task, the examinee stood with feet together next to the line with hands on hips. The examinee hopped back and forth over the line with knee bent 90 degrees. The second trial was conducted if the examinee stumbles or falls during the first trial. The number of correct hops performed in 15 seconds was recorded.
5. Two legged side hop: In this task, the examinee stood with feet together next to the line with hands on hips. The examinee hopped back and forth over the line. The second trial was conducted if the examinee stumbles or falls during the first trial. The number of correct hops performed in 15 seconds was recorded. A hop was incorrect if the examinee fails to keep both the feet together, fails to keep hands on hips.

A trial was given to children before starting the tasks. Precautions were taken to avoid the children from falling. Subjects were assessed for these tasks and a raw score was recorded in the unit measured (e.g. a number of hopping) and then converted to a numerical point score. Further analysis was done with the help of the BOT-2 manual. The data collected were analyzed using suitable analysis.

between males & females as  $p \leq 0.001$ . Male performance was higher than females. Percentage of the for descriptive category according to gender are shown in Table 2. It is indicated that participants in average category were more as compare to other groups amongst males and females which was statistically significant using chi square test ( $p=0.03$ ).

**Table 1. Running speed and agility total point score according to Gender**

	Mean	Std Dev
Female	30.15	5.52
Male	32.63	6.48
Combined	31.44	6.16

$p \leq 0.001$  using Mann Whitney test.

**Table 2. Descriptive Category according to Gender**

GENDER	Descriptive category					Total
	Well above average	Above average	Average	Below average	Well below average	
Female	0.00%	3.63%	75.40%	20.97%	0.00%	100%
Male	0.00%	4.85%	82.46%	12.69%	0.00%	100%
TOTAL	0.00%	4.26%	79.07%	16.67%	0.00%	100%

Using chi square test,  $p=0.03$ .

Descriptive category according to age group is given in Table 3. In all groups, children coming in average category were maximum followed by below average category. This

difference was statistically not significant when various age group was considered as  $p=0.88$ . Hence it is indicated that age group does not pursue according to descriptive category.

**Table 3. Descriptive category according to age group**

		Descriptive category				Total
		Well above average	Above average	Average	Below average	
Age group 1	0	4.50%	80.18%	15.32%	0.00%	100.00%
Age group 2	0	4.21%	81.05%	14.74%	0.00%	100.00%
Age group 3	0	6.48%	75.93%	17.59%	0.00%	100.00%
Age group 4	0	4.00%	80.00%	16.00%	0.00%	100.00%
Age group 5	0	1.96%	78.43%	19.61%	0.00%	100.00%
TOTAL	0	4.26%	79.07%	16.67%	0.00%	100.00%

Using chi square test,  $p=0.88$

## DISCUSSION

The present work compared the running speed and agility in 5 to 15 school going children. When RSA total point score was analyzed, females have less mean score of 30.15 than that of males which have 32.63. This is mostly because males have greater muscle mass and a larger portion of it is fast twitch, which allows them to generate greater force, speed and energy. Also they have higher aerobic capacity ( $VO_2$  max) as compare to females which is due to their typically having less body fat, more hemoglobin and muscle mass and larger lungs and heart as compare to women.

In case of descriptive category according to gender, more number of males comes under average category than females, in below average category number of females were more than males and in average category males were more than females. No participants come under well above average and well below average category. Overall it came to a result that males have better scores than females. It is given that the difference was greatest during the adolescent period. This is due to hormones as the primary male hormone is testosterone, which primarily stimulates muscle

mass development where as female primary hormone is estrogen, which stimulates fat accumulation. Testosterone also increases concentration of red blood cells and hemoglobin, both are important for transporting oxygen around the body [9]. Second, level of sport participation of females is significantly lower than that of boys. So, males are more active, fast and better in performing activities [10].

In case of descriptive category according to age group, as the age group increases, better scores are found in participants but there is slight drop in Age group 3. According to studies, body composition and body size are important factors that affect performance in motor related fitness. It also varies among performances and with age [9]. Other factors such as school physical education also play an important role in developing a child's physical fitness and education.

This result is in contrast with point score result as the descriptive categories are allotted according to the scale score. Brenda N. Wilson et al in their study said that, the use of subtest point score will result in a more precise measurement of functions, because gains or deterioration will be related to specific areas of motor control. In addition, score that have undergone statistical transformations will be less exact in their ability to detect real changes that occurred. Because these standard scores are age adjusted, progress will not be reflected in the test scores unless the progress is faster than typical maturation. Therapists should consider using the subtest point scores as a more accurate measure of change.

The study has outlined the limitation of not taking the socio-economic status and body mass index for nutritional status. Because studies have shown that socioeconomic status alters the motor performance of the child. According to Özgür Mülazımoğlu-Ballı in his study he stated that there were significant differences in the BOT-2 score and total score of different socioeconomic groups, in favor of high socioeconomic groups.

## CONCLUSION

From the above study, it is concluded that maximum number of participants comes under average category. Mean point score of Running speed and agility was significantly more in males than females, maximum subjects were in average in males and females but when age was considered, descriptive category was not significant. The performance of male participants was better as compare to female participants.

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