

Standardization of Motor Fitness Norms for Secondary School Students in North-Eastern States of India

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Abstract Norms are essential for accurately assessing physical fitness, especially for early sports talent identification and training in childhood. This study addresses the gap in consistent and reliable physical fitness norms for secondary school children in North-Eastern India. The aim was to establish standardized motor fitness norms for boys aged 13 to 16 years. Using a simple random sampling technique, selected were a sample of 200 boys from five schools across North-Eastern India. Data from six motor fitness tests (Push-Up, Vertical Jump, Shuttle Run, 800m Run/Walk, 50m Dash, and Medicine Ball Put) were collected and converted into T-scores to develop T-scale norms. These norms provide a valuable benchmark for evaluating physical fitness levels and can guide the development of targeted physical education programs. The research promotes healthier lifestyles and advances sports and physical education.

Keywords Norms; Secondary School Children; Motor Fitness; North-East India; Standardization; Fitness Test.

1. Introduction

Physical fitness is critical for sports performance and contributes significantly to a healthy, fulfilling life [1,2]. It includes cardiovascular endurance, flexibility, muscular strength, endurance, and body composition, essential for overall well-being [3,4]. Motor fitness, a crucial component, involves coordination, balance, agility, strength, and speed, vital for everyday activities [5,6]. Researchers, healthcare professionals, and policymakers increasingly recognize the importance of motor fitness in promoting healthy aging and preventing chronic diseases [7,8]. Evidence links motor fitness to improved cardiovascular health, reduced fall risk, and enhanced cognitive function [9,10].

Norms are vital for accurately assessing and interpreting physical fitness, allowing comparisons of individual abilities [11,12]. Given the unique developmental trajectories of individuals, physical education programs must consider these differences to effectively cater to group needs [13,14]. This study addresses the gap in motor fitness norms for secondary school children in the North-Eastern states of India, focusing on boys aged 13 to 16. By establishing specific norms, the study aimed to facilitate the assessment of motor fitness levels, providing valuable insights into students' physical abilities and areas for improvement. These norms will enhance physical education and sports training programs, promoting healthier lifestyles and advancing the field.

2. Materials and Methods

Participants

A sample of 200 secondary school boys, aged 13 to 16 years, was selected from five schools in the North-Eastern states of India. The schools included:

- KV Lunglei (Mizoram)
- KV Happy Valley Shillong (Meghalaya)
- KV Mangaldoi (Assam)
- KV Tuting (Arunachal Pradesh)
- KV Gangtok (Sikkim)

Each school contributed 40 local students, selected through simple random sampling to ensure true representativeness.

Study Design and Procedure

Participants were evaluated using six motor fitness tests:

- Push-Up (Strength Endurance)
- Vertical Jump (Leg Power)
- Shuttle Run (Speed and Agility)
- 800m Run/Walk (Endurance)
- 50m Dash (Speed)
- Medicine Ball Put (Arm Power)

Tests were conducted under standardized conditions, with instructions provided to participants.

Data Analysis

Raw scores from the tests were converted into T-scores, allowing comparison across tests and age groups. T-scale norms for boys aged 13 to 16 years were developed.

Percentile norms for each test and age group were calculated and presented in tables (Tables 3 to 8), providing benchmarks for motor fitness levels. Raw scores and T-scores are detailed in Table 9.

Statistical Methods

Descriptive statistics, including means and standard deviations, were calculated for each test (Table 1). A correlation matrix was developed to examine relationships between motor fitness components (Table 2). Statistical analysis was performed using SPSS, ensuring accuracy.

3. Results

Table 1 - Means and Standard Deviations of Test Scores

Sl. No.	Test Variables	Mean	S.D.
1	Push Up (Strength Endurance)	9.25	6.85
2	Vertical Jump (Leg Power)	40.85	1.95
3	Shuttle Run (Speed, Agility)	11.90	0.49
4	800m Run/Walk (Endurance)	191.71	25.02
5	50m Dash (Speed)	8.36	0.87
6	Medicine Ball Put (Arm Power)	6.20	4.35

Table 2 - Correlation Matrix among the six variables

	Push Up	Vertical Jump	Shuttle Run	800m Run/Walk	50m Dash	Medicine Ball Put
Push Up	1.00	0.25	0.34	0.04	0.03	0.41

Vertical Jump	0.25	1.00	0.17	0.01	0.00	0.24
Shuttle Run	0.34	0.17	1.00	0.06	0.06	0.57
800m Run/Walk	0.04	0.01	0.06	1.00	0.02	-0.06
50m Dash	0.03	0.00	0.06	0.02	1.00	-0.01
Medicine Ball Put	0.41	0.24	0.57	-0.06	-0.01	1.00

Table 3 – Percentile norms for Push-Up (Age-wise)

Percentile	13 years	14 years	15 years	16 years
100	30	33	36	35
90	25	26	29	29
80	22	22	24	25
70	18	19	19	18
60	12	13	14	14
50	10	11	10	12
40	9	10	10	11
30	8	8	9	9
20	6	7	7	7
10	4	3	5	5

Table 4 – Percentile norms for Vertical Jump in cms. (Age-wise)

Percentile	13 years	14 years	15 years	16 years
100	64.1	68.5	67.6	70.1
90	59.0	61.2	62.9	65.2
80	55.7	55.7	55.8	59.0
70	49.3	50.8	51.1	53.3
60	44.4	45.6	47.9	49.2
50	41.0	42.8	43.5	43.6
40	36.6	38.1	37.2	40.7
30	32.9	33.1	31.3	31.2
20	27.0	24.8	25.0	26.0
10	22.5	20.4	22.9	23.9

Table 5 – Percentile norms for Shuttle Run (Age-wise)

Percentile	13 years	14 years	15 years	16 years
100	9.95	9.80	9.51	9.62
90	10.70	10.35	10.00	10.27
80	11.98	11.72	11.53	11.55
70	12.12	12.25	12.17	12.03
60	11.33	11.00	10.32	10.07
50	11.85	11.48	10.97	10.82
40	12.03	11.99	12.31	11.76
30	13.78	13.53	13.29	13.15
20	14.23	14.15	13.99	14.08
10	16.47	17.08	15.39	14.74

Table 6 – Percentile norms for 800m Walk/Run (Age-wise)

Percentile	13 years	14 years	15 years	16 years
100	02:55	02:54	02:45	02:50
90	03:00	02:59	02:58	02:57
80	03:02	03:05	03:00	03:01
70	03:09	03:11	03:06	03:07
60	03:14	03:18	03:10	03:11
50	03:30	03:25	03:21	03:16
40	03:46	03:33	03:28	03:31
30	04:21	04:23	04:26	04:00
20	04:58	04:51	04:42	04:27
10	06:15	05:05	05:19	05:22

Table 7 – Percentile norms for 50m Dash (Age-wise)

Percentile	13 years	14 years	15 years	16 years
100	6.56	6.33	6.18	6.16
90	6.89	6.67	6.23	6.39
80	7.01	6.98	6.59	6.82
70	7.19	7.15	7.09	6.97
60	7.32	7.35	7.18	7.01
50	7.45	7.40	7.29	7.36
40	7.89	7.77	7.65	7.45
30	8.12	8.56	7.99	7.94
20	8.56	8.81	8.43	8.18
10	9.81	9.23	9.54	9.09

Table 8 – Percentile norms for Medicine Ball Put (Age-wise)

Percentile	13 years	14 years	15 years	16 years
100	10.4	12.01	12.5	12.3
90	10.1	11.2	11.7	11.5
80	9.1	9.3	10.6	10.1
70	8.1	7.8	9.1	9.7
60	7.5	6.9	7.7	8.5
50	6.1	6.2	6.8	7.0
40	6.0	6.1	6.5	6.3
30	5.5	5.9	6.1	6.0
20	5.1	5.2	5.3	5.7
10	4.1	5.1	4.8	5.5

Table 9 – T-Scale Norms for all the 6 fitness tests

T-Score	Push Up	Vertical Jump	Shuttle Run	800m Run/Walk	50m Dash	Medicine Ball Put
100	31 and above	70 and above	9.1 and below	02:12 and below	6.1 and below	12.4 and above

90	29	68	9.4	02:22	6.2	12.0
80	28	66	9.7	02:32	6.3	11.5
70	26	62	10	02:42	6.5	11.0
60	21	54	10.9	03:12	6.9	9.6
50	16	46	11.8	03:42	7.3	8.2
40	11	38	12.7	04:12	7.7	6.8
30	6	30	13.6	04:42	8.1	5.4
20	3	25	14.1	04:59	8.3	4.7
10	1 and below	22 and below	14.5 and above	05:12 and above	8.5 and above	4.0 and below

4. Discussion

The study developed norms to measure the motor fitness status of boys aged 13 to 16 years in North-Eastern states of

India. The results, presented in percentile ranks, provide valuable benchmarks for coaches and trainers. The six motor fitness tests (Push-Up, Vertical Jump, Shuttle Run, 800m Run/Walk, 50m Dash, and Medicine Ball Put) showed a general increase in performance with age, consistent across most tests. However, variations in vertical jump and push-up performance suggest further investigation is needed.

Analysis and Correlations

Older students generally performed better, aligning with research indicating that motor skills improve with age. The inter-correlation matrix shows low to medium correlations among tests, suggesting they measure different motor fitness components.

Limitations and Further Research

The study's limitations include a relatively small sample size and geographic focus. Future research should include larger, more diverse samples and explore factors such as nutrition and socio-economic status to better understand motor fitness development.

Practical Applications

The norms developed provide practical tools for assessing motor fitness levels in secondary school boys. Educators and trainers can use these benchmarks to identify improvement areas and make physical education programs, promoting better physical fitness and health.

5. Conclusion

Motor fitness is crucial for adolescents, influencing their physical development and overall health. This study standardized motor fitness tests for boys aged 13 to 16 in North-Eastern India, offering valuable percentile norms. These benchmarks help evaluate physical fitness levels and guide physical education programs, promoting healthier lifestyles. Future research should consider larger, more diverse samples and additional geographical areas to improve generalizability.

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