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Establishing norms for physical fitness assessment: A study on male collegiate students aged 18-25 using the AAHPERD youth fitness test

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Abstract
This study aims to establish physical fitness norms for male collegiate students aged 18-25, focusing on the AAHPERD Youth Fitness Test. Through descriptive statistics and percentile plots, various performance levels across various fitness parameters were analyzed. The data, collected from 198 participants, offer valuable insights into the distribution of physical fitness within this demographic. Performance is categorized into five grades, from "Very Poor" to "Very Good," allowing educators and health professionals to assess individual fitness levels and tailor interventions accordingly. These norms not only serve as benchmarks for evaluating fitness standards but also contribute to a broader understanding of physical health trends among young adults, highlighting areas for improvement and promoting optimal fitness levels among collegiate students.

Keywords: Physical fitness, normative data, collegiate students, AAHPERD youth fitness test, performance assessment

Introduction
What is physical fitness? The U.S. Department of Health and Human Services separates physical fitness into two categories: health-related fitness and performance-related fitness (U.S. Department of Health and Human Services, 2008). Regular physical activity is known to confer numerous health benefits, including improvements in social health, reduction in symptoms of depression and generalized anxiety, and alleviation of sleep deprivation (Cramer, Nieman, & Lee, 1991; Hassmen, Koivula, & Uutela, 2000; De Moor *et al*., 2006; Barbour & Blumenthal, 2005; Driver & Taylor, 2000) [2, 6, 3, 1, 4]. Physical fitness is thus a crucial indicator of an individual's overall health and their ability to perform physical activities and exercise (Ortega *et al*., 2008) [10].
In adults, cardiorespiratory fitness (CRF) and musculoskeletal fitness (MSF) are particularly significant as they are strongly correlated with lower mortality and reduced cancer risk, independent of factors such as obesity and physical activity levels (Lee *et al*., 2011; Kodama *et al*., 2009; Katzmarzyk & Craig, 2002; Sawada *et al*., 2014) [9, 8, 7, 13]. Research indicates that CRF has a more substantial inverse relationship with mortality compared to physical activity alone (Erikssen *et al*., 1998; Slattery & Jacobs, 1988) [5, 14].
To understand and evaluate physical fitness levels among young adults, this study focuses on developing normative data for a range of fitness tests among collegiate students. By establishing norms, we can better assess individual fitness levels, identify areas for improvement, and tailor physical education programs to enhance overall health and performance.

Selection of subjects
For the present study, 198 male subjects aged 18-25 were selected from Khalsa College for Physical Education, which is affiliated with Maharaja Bhupinder Singh University, Patiala. Participants with any acute or chronic physical diseases that would limit their ability to participate in the study were excluded.

Selection of test

The AAHPERD Youth Fitness Test was chosen to develop norms for the study. The test comprised the following items:

1. Pull-Ups.
2. Bent Knee Sit-Ups.
3. 4x10 Yards Shuttle Run.
4. Standing Broad Jump.
5. 50 M Dash.
6. 600 M Run/Walk.

Aim and Objectives

This study aims to establish physical fitness norms for male collegiate students aged 18-25, utilizing the AAHPERD Youth Fitness Test. This test includes assessments of upper body strength (Pull-Ups), core strength (Bent Knee Sit-Ups), agility (4x10 Yards Shuttle Run), explosive power (Standing Broad Jump), sprinting speed (50 Meter Dash), and endurance (600 Meter Run/Walk). The results will provide a comprehensive overview of fitness levels in this population and offer a framework for categorizing performance into five grades: very good, good, average, poor, and very poor. This research will not only aid in benchmarking fitness standards but also contribute to the broader understanding of physical health trends among young adults.

Statistical treatment: Descriptive statistics (Mean and standard deviation) and percentile plots (High and low) were calculated using SPSS. By using descriptive statistics and percentile plots, we aim to deliver a strong set of norms that can be applied in physical education settings to monitor and enhance the physical fitness of students.

Results

Table 1: Descriptive Statistics of Physical Fitness Tests.

	Pull-Ups	Bent Knee Sit-Ups	4x10 Yards Shuttle Run	Standing Broad Jump	50 M Dash	600 M Run/Walk
N	198	198	198	198	198	198
Mean	18.0303	39.0104	10.5889	1.9242	7.9855	2.5860
Median	16.0000	38.0000	10.6800	1.9200	7.9100	2.4400
Mode	15.00	35.00	11.00	1.90	9.00	3.10
Minimum	7.00	4.55	8.00	1.27	3.90	1.42
Maximum	53.00	62.00	12.62	2.80	10.05	3.47

The table 1 presents descriptive statistics for a variety of physical fitness tests conducted on a sample of 198 individuals. The tests included measures of upper body strength with Pull-Ups, core strength with Bent Knee Sit-Ups, agility with a 4x10 Yards Shuttle Run, explosive power with a Standing Broad Jump, sprinting speed with a 50 Meter Dash, and endurance with a 600 Meter Run/Walk. The data reveal diverse performance levels among the participants across these exercises. For instance, while the average number of Pull-Ups performed was 18.03, there was notable variability with a range from 7 to 53. Similarly, the 50 Meter Dash showed consistent performance among participants with an average time of 7.99 seconds. Conversely, the Bent Knee Sit-Ups exhibited a slightly skewed distribution toward higher repetitions, with a mean of 39.01 and a median of 38.

Table 2: Percentile Table for Physical Fitness Tests

Event		Pull-Ups	Bent Knee Sit-Ups	4x10 Yards Shuttle Run	Standing Broad Jump	50 M Dash	600 M Run/Walk
Percentiles	10	10.0000	29.9000	10.0000	1.6000	6.8000	2.1180
	20	12.0000	32.0000	10.2000	1.7200	7.2400	2.3000
	30	14.0000	35.0000	10.3000	1.9000	7.5600	2.3800
	40	15.0000	37.0000	10.5000	1.9000	7.7360	2.4000
	50	16.0000	38.0000	10.6800	1.9200	7.9100	2.4400
	60	17.4000	40.0000	10.8040	1.9500	8.3320	2.5000
	70	19.0000	43.0000	11.0000	2.0000	8.7000	2.9000
	80	21.0000	47.0000	11.0000	2.1000	8.8500	3.1000
	90	27.1000	50.0000	11.3000	2.2420	9.0000	3.1710

The data is segmented into percentiles, offering insight into the distribution of performance levels within this population. Based on the percentile data, performance is categorized into five grades.

- **Very Good:** Performance at or above the 90th percentile
- **Good:** Performance between the 70th and 89th percentiles
- **Average:** Performance between the 40th and 69th percentiles
- **Poor:** Performance between the 20th and 39th percentiles
- **Very Poor:** Performance at or below the 10th percentile

1. Pull-Ups: For the Pull-Ups test, performance is categorized into five grades based on percentile rankings. Individuals falling in the 10th percentile, performing 10 or fewer pull-ups, are classified as having "Very Poor" performance. Those in the 20th percentile, completing between 11 and 12 pull-ups, are considered to have "Poor" performance. Participants performing between 13 and 16 pull-ups, which places them in the 30th to 50th percentiles, are deemed "Average." A "Good" performance is indicated by achieving 17 to 21 pull-ups, corresponding to the 60th to 80th percentiles. Finally, performing 22 or more pull-ups, which places an individual in the 90th percentile, is classified as "Very Good."

2. Bent Knee Sit-Ups: For the Bent Knee Sit-Ups test, performance is categorized similarly based on percentile rankings. Those performing 29.9 or fewer sit-ups, placing them in the 10th percentile, are classified as having "Very Poor" performance. Individuals in the 20th percentile, with 30 to 32 sit-ups, are considered to have "Poor" performance. Completing between 33 and 38 sit-ups, falling within the 30th to 50th percentiles, indicates "Average" performance. Achieving 39 to 47 sit-ups, which corresponds to the 60th to 80th percentiles, is classified as "Good." Finally, performing 48 or more sit-ups, placing one in the 90th percentile, is deemed "Very Good."

3. 4x10 Yards Shuttle Run (Seconds): For the 4x10 Yards Shuttle Run, the times are interpreted with lower times indicating better performance. Individuals who take 11.3 seconds or more, placing them in the 90th percentile, are categorized as having "Very Poor" performance. Those with times between 11.0 and 11.2 seconds, corresponding to the 70th to 80th percentiles, are classified as "Poor." A time range of 10.7 to 10.9 seconds, which falls within the 40th to 60th percentiles, indicates "Average" performance. Times between 10.2 and 10.6 seconds, placing individuals in the 20th to 30th percentiles, are considered "Good." Lastly, those who complete the shuttle run in 10.0 seconds or less, corresponding to the 10th percentile, are deemed to have "Very Good" performance.

4. Standing Broad Jump (Meters): The Standing Broad Jump test assesses lower body strength and explosive power through the distance jumped. Performance is categorized based on achieved distances: those jumping ≤ 1.6 meters are classified as "Very Poor," placing them in the 10th percentile; a distance range of 1.61 to 1.72 meters denotes "Poor," corresponding to the 20th percentile. Individuals achieving distances between 1.73 and 1.92 meters fall within the "Average" category, spanning the 30th to 50th percentiles. "Good" performance encompasses jumps ranging from 1.93 to 2.1 meters, positioning individuals within the 60th to 80th percentiles. Finally, distances of ≥ 2.11 meters are considered "Very Good," indicating performance at the 90th percentile level or above.

5. 50 Meter Dash (Seconds): The 50 Meter Dash measures sprinting speed, providing insights into how quickly individuals cover the distance. Performance is classified based on the time taken to complete the dash: those clocking in at 9.0 seconds or more are categorized as "Very Poor," positioned within the 90th percentile. Falling into the "Poor" category are individuals with times ranging from 8.71 to 8.85 seconds, representing the 70th to 80th percentiles. "Average" performance is defined by times between 7.91 and 8.33 seconds, encompassing the 40th to 60th percentiles. "Good" performance is achieved with times spanning from 7.24 to 7.736 seconds, placing individuals within the 20th to 30th percentiles. Lastly, those completing the dash in 6.8 seconds or less are recognized for their "Very Good" performance, ranking within the 10th percentile.

6. 600 Meter Run/Walk (Minutes): The 600 Meter Run/Walk assesses endurance and cardiovascular fitness, evaluating the time taken to complete the distance. Performance categories are determined by minutes elapsed: those finishing in 3.171 minutes, or more are classified as "Very Poor," positioned within the 90th percentile. Falling into the "Poor" category are individuals with times ranging from 3.101 to 3.17 minutes, representing the 80th percentile. "Average" performance is defined by times between 2.441 and 2.5 minutes, encompassing the 40th to 60th percentiles. "Good" performance is achieved with times spanning from 2.301 to 2.38 minutes, placing individuals within the 20th to 30th percentiles. Lastly, those completing the run/walk in 2.118 minutes or less are recognized for their "Very Good" performance, ranking within the 10th percentile.

Discussion

In establishing physical fitness norms for male collegiate students aged 18-25 using the AAHPERD Youth Fitness Test, it's crucial to consider the broader discourse surrounding fitness norms construction and assessment methodologies. Several studies have contributed significantly to this field, offering insights into the development, application, and implications of fitness norms across different demographics. Rikli and Jones (2001) [12] introduced age- and gender-specific fitness norms, emphasizing the need for demographic-specific assessments to account for physiological variations. Ortega *et al*. (2008) [10] investigated physical fitness in childhood and adolescence as a marker of future health, underscoring the lifelong implications of fitness interventions. Likewise, Lee *et al*. (2011) [9] compared different aspects of physical fitness as predictors of mortality, emphasizing the importance of comprehensive fitness assessment in mortality risk prediction. Our study aligns with and contributes to this discourse by providing a framework for evaluating and categorizing individual performance across various fitness parameters among young adult males, thereby promoting optimal health and performance across different populations.

Conclusion

The establishment of physical fitness norms for male collegiate students aged 18-25, utilizing the AAHPERD Youth Fitness Test, provides a comprehensive framework for evaluating and categorizing individual performance across various fitness parameters. Through descriptive statistics and percentile plots, this study offers valuable insights into the distribution of physical fitness levels within this demographic. The data reveal diverse performance levels across different fitness tests, highlighting areas of strength and areas for improvement. By categorizing performance into five grades ranging from "Very Poor" to "Very Good," educators and health professionals can better assess individual fitness levels, tailor interventions, and design targeted physical education programs to enhance overall health and performance. These norms not only serve as benchmarks for evaluating fitness standards but also contribute to a broader understanding of physical health trends among young adults. Moving forward, continued monitoring and adaptation of these norms will be essential for promoting and maintaining optimal physical fitness levels among collegiate students.

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