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# Establishing fitness norms: A study on physical fitness assessment in female college students aged 18-25 using the AAHPERD youth fitness test

## Veena Devi and Manoj Bhardwaj

**Abstract**
This study delves into the physical fitness levels of female college students aged 18-25, employing the AAHPERD Youth Fitness Test. Its objective is to establish fitness norms and benchmarks, facilitating tailored interventions for this demographic. 78 participants from Khalsa College for Physical Education, Patiala, underwent assessment across six fitness components. Utilizing descriptive statistics and percentile plots, the data was analyzed and categorized into five distinct grades: very good, good, average, poor, and very poor. This research significantly contributes to enhancing the understanding and promoting the health of female college students, offering a normative framework for future interventions and research endeavors.

**Keywords:** Physical fitness assessment, female college students, AAHPERD Youth Fitness Test, fitness norms

## Introduction

Physical fitness is a vital factor contributing to children's physical growth, well-being, and overall development. Numerous studies have highlighted the strong relationship between physical fitness in youth and various health outcomes, both immediate and long-term. Physical fitness encompasses components such as physical health and skill-related attributes, which have been linked to cognitive skills later in life (Esteban-Cornejo *et al*., 2015; Drozdowska *et al*., 2021) [5, 4]. Furthermore, improved physical fitness in youth is associated with better academic performance and cognitive functioning, emphasizing the role of physical activity in holistic development (Booth *et al*., 2014; Chaddock *et al*., 2010) [1, 3].

Physical fitness is expected to be developed through regular engagement in physical activity, defined as "any bodily movement produced by skeletal muscles that results in energy expenditure" (Caspersen, Powell, & Christenson, 1985) [2]. Engaging in physical activity enhances multiple components of physical fitness, including muscle strength, muscle endurance, power, balance, cardiovascular health, and flexibility. These components are essential not only for physical health but also for preventing chronic diseases in adulthood, such as cardiovascular diseases, diabetes, and obesity (Warburton, Nicol, & Bredin, 2006) [14].

Physical activity in early childhood is integral to desirable future health outcomes, such as increased bone health indicators and a reduced risk of excessive weight gain and adiposity (Pate *et al*., 2019) [8]. Studies have also shown that early engagement in physical activity can lead to sustained physical activity habits throughout life, which are crucial for long-term health (Telama *et al*., 2005) [12].

Over the past decades, the lifestyle of children and adolescents has undergone significant modifications. A considerable portion of free time is now occupied by sedentary activities, primarily due to technological advancements and the wide availability of electronic games (Petroski *et al*., 2012; Pelegrini *et al*., 2011) [10, 9]. Furthermore, decreased safety in urban streets and public spaces reduces opportunities for engaging in traditional games that promote physical activity (Ronque *et al*., 2010) [11]. These changes have led to lower physical activity levels among young people, resulting in reduced health-related physical fitness (Mota *et al*., 2010) [7].

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The impact of sedentary behavior on physical fitness is well-documented. Sedentary lifestyles contribute to poor cardiovascular health, increased body fat, and diminished muscular strength and endurance (Tremblay *et al*., 2011) [13]. Moreover, the rise in sedentary behavior correlates with increased screen time, which has been shown to negatively affect sleep patterns and mental health in adolescents (Hale & Guan, 2015) [6]. Addressing these trends requires comprehensive strategies that promote physical activity and reduce sedentary behavior across various settings, including schools and communities (Biddle *et al*., 2019) [15].

Given these trends, establishing norms for physical fitness assessments is crucial. Accurate and relevant fitness norms help in identifying at-risk populations and tailoring interventions accordingly. This study focuses on female collegiate students aged 18-25, utilizing the AAHPERD Youth Fitness Test to establish relevant fitness norms. By developing these norms, we aim to provide a benchmark for physical fitness levels and contribute to better health outcomes for this demographic.

## Selection of subjects
In this study, 78 female subjects aged 18 to 25 were recruited from Khalsa College for Physical Education, affiliated with Maharaja Bhupinder Singh University in Patiala. Inclusion criteria required that all participants be free from acute or chronic physical conditions that could impair their ability to fully engage in the study. This careful selection process aimed to create a homogeneous sample of healthy individuals, thereby minimizing variability due to health-related factors, and enhancing the reliability and validity of the study outcomes.

## Selection of test
The AAHPERD Youth Fitness Test was selected to establish normative data for this study. This comprehensive test battery includes the following components.
1. Flexed Arm Hang.
2. Bent Knee Sit-Ups.
3. 4x10 Yards Shuttle Run.
4. Standing Broad Jump.
5. 50 M Dash.
6. 600 M Run/Walk.

Each component was chosen for its ability to assess distinct dimensions of physical fitness, ensuring a well-rounded evaluation of the participants' overall fitness levels. This test battery is recognized for its effectiveness in measuring key aspects such as strength, endurance, agility, speed, and cardiovascular fitness, thereby providing a comprehensive assessment framework.

## Aim and objectives
The aim of this study is to establish predictive physical fitness norms for female collegiate students. The specific objectives are as follows.
1. To calculate descriptive statistics, including mean and standard deviation, for the selected fitness parameters.
2. To develop percentile plots to identify high and low performance benchmarks.
3. To categorize the results into five distinct grades: very good, good, average, poor, and very poor.

These objectives will provide a comprehensive assessment of physical fitness levels among the participants, facilitating the development of standardized fitness norms and aiding in the identification of performance benchmarks.

## Statistical Treatment
Descriptive statistics, including mean and standard deviation, were calculated to summarize the data. Additionally, percentile plots were generated to identify performance benchmarks across different fitness levels. All statistical analyses were performed using SPSS software, ensuring accurate and reliable results.

## Results

**Table 1:** Descriptive Statistics of Physical Fitness Tests.

| | | Flexed Arm Hang | Bent Knee Sit-Ups | 4x10 Yards Shuttle Run | Standing Broad Jump | 50 M Dash | 600 M Run/Walk |
|---|---|---|---|---|---|---|---|
| N | Valid | 78 | 78 | 78 | 78 | 78 | 78 |
| Mean | | 43.6410 | 33.5846 | 11.4926 | 1.6904 | 8.9913 | 2.6429 |
| Median | | 13.0000 | 33.5000 | 11.2550 | 1.7000 | 8.9900 | 2.4800 |
| Std. Deviation | | 86.80235 | 8.71917 | .79773 | .28550 | 1.76545 | .40747 |
| Minimum | | 6.00 | 4.70 | 10.20 | 1.14 | 6.50 | 2.12 |
| Maximum | | 634.00 | 51.00 | 14.35 | 2.53 | 21.13 | 3.44 |

The descriptive statistics for the physical fitness tests conducted on 78 female participants provide a comprehensive overview of their fitness levels. The Flexed Arm Hang exhibited a mean of 43.6410 seconds and a median of 13.0000 seconds, with a significant standard deviation of 86.80235 seconds, indicating substantial variability and a few outliers with exceptionally high durations. In contrast, the Bent Knee Sit-Ups had a mean of 33.5846 repetitions and a median of 33.5000 repetitions, with a standard deviation of 8.71917, suggesting a more consistent performance around the central values. The 4x10 Yards Shuttle Run showed a mean time of 11.4926 seconds and a median of 11.2550 seconds, with a small standard deviation of 0.79773 seconds, reflecting tight clustering and consistent agility among participants. The Standing Broad Jump results had a mean of 1.6904 meters and a median of 1.7000 meters, with a moderate standard deviation of 0.28550 meters, indicating some variability in lower body power. The 50 M Dash times varied widely, with a mean of 8.9913 seconds, a median of 8.9900 seconds, and a standard deviation of 1.76545 seconds, showing diverse sprinting capabilities among participants. Finally, the 600 M Run/Walk times were relatively consistent, with a mean of 2.6429 minutes, a median of 2.4800 minutes, and a standard deviation of 0.40747 minutes, indicating generally similar endurance levels. Overall, these statistics highlight the varying degrees of physical fitness among the participants, with certain tests showing more variability than others, reflecting differences in specific fitness components such as strength, agility, and endurance.

**Table 2:** Percentile Table for Physical Fitness Tests.

| Event | | Flexed Arm Hang | Bent Knee Sit-Ups | 4x10 Yards Shuttle Run | Standing Broad Jump | 50 M Dash | 600 M Run/Walk |
|---|---|---|---|---|---|---|---|
| Percentiles | 10 | 6.0000 | 24.9000 | 10.7750 | 1.3920 | 7.4440 | 2.3190 |
| | 20 | 7.8000 | 27.0000 | 11.0000 | 1.4000 | 7.7900 | 2.3780 |
| | 30 | 9.0000 | 30.0000 | 11.0200 | 1.5070 | 8.0000 | 2.4000 |
| | 40 | 10.0000 | 32.0000 | 11.1420 | 1.6000 | 8.4680 | 2.4100 |
| | 50 | 13.0000 | 33.5000 | 11.2550 | 1.7000 | 8.9900 | 2.4800 |
| | 60 | 18.8000 | 35.0000 | 11.4360 | 1.7580 | 9.3000 | 2.4800 |
| | 70 | 28.3000 | 37.0000 | 11.9000 | 1.8060 | 9.5300 | 2.5560 |
| | 80 | 54.2000 | 40.0000 | 12.0000 | 1.9000 | 9.8600 | 3.2600 |
| | 90 | 125.1000 | 45.4000 | 12.3900 | 2.0910 | 10.1100 | 3.4000 |

**Flexed Arm Hang (Seconds)**
- **Very Poor:** 125.1 seconds or more (90th percentile).
- **Poor:** 54.2 to 125.0 seconds (80th percentile).
- **Average:** 28.3 to 54.1 seconds (70th percentile).
- **Good:** 18.8 to 28.2 seconds (60th percentile).
- **Very Good:** 10.0 to 18.7 seconds (50th percentile or below).

**Bent Knee Sit-Ups**
- **Very Poor:** 45.4 or fewer sit-ups (90th percentile).
- **Poor:** 40.0 to 45.3 sit-ups (80th percentile).
- **Average:** 37.0 to 39.9 sit-ups (70th percentile).
- **Good:** 35.0 to 36.9 sit-ups (60th percentile).
- **Very Good:** 32.0 to 34.9 sit-ups (50th percentile or below).

**4x10 Yards Shuttle Run (Seconds)**
- **Very Poor:** 12.39 seconds or more (90th percentile).
- **Poor:** 12.00 to 12.38 seconds (80th percentile).
- **Average:** 11.90 to 11.99 seconds (70th percentile).
- **Good:** 11.43 to 11.89 seconds (60th percentile).
- **Very Good:** 11.02 to 11.42 seconds (50th percentile or below).

**Standing Broad Jump (Meters)**
- **Very Poor:** 2.091 meters or less (90th percentile).
- **Poor:** 1.900 to 2.090 meters (80th percentile).
- **Average:** 1.806 to 1.899 meters (70th percentile).
- **Good:** 1.758 to 1.805 meters (60th percentile).
- **Very Good:** 1.600 to 1.757 meters (50th percentile or below).

**50 Meter Dash (seconds)**
- **Very Poor:** 10.11 seconds or more (90th percentile)
- **Poor:** 9.86 to 10.10 seconds (80th percentile)
- **Average:** 9.53 to 9.85 seconds (70th percentile)
- **Good:** 9.3 to 9.52 seconds (60th percentile)
- **Very Good:** 8.99 to 9.29 seconds (50th percentile or below)

**600 Meter Run/Walk (Minutes)**
- **Very Poor:** 3.40 minutes or more (90th percentile).
- **Poor:** 3.26 to 3.39 minutes (80th percentile).
- **Average:** 2.56 to 3.25 minutes (70th percentile).
- **Good:** 2.48 to 2.55 minutes (60th percentile).
- **Very Good:** 2.31 to 2.47 minutes (50th percentile or below).

**Conclusion**
In conclusion, this study has successfully investigated the physical fitness levels of female college students aged 18-25 using the AAHPERD Youth Fitness Test. Through the analysis of descriptive statistics and percentile plots, the research has provided valuable insights into the fitness norms and benchmarks for this demographic.

The descriptive statistics revealed varying degrees of physical fitness among the participants across different fitness components. While some tests showed consistent performance around the central values, others exhibited significant variability, highlighting differences in specific fitness attributes such as strength, agility, and endurance.

Furthermore, the percentile tables categorized the results into five distinct grades, ranging from very good to very poor, providing a clear framework for assessing individual fitness levels. These benchmarks offer valuable guidance for identifying at-risk populations and tailoring interventions to address specific fitness needs effectively.

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