

# A Comparative Study of Physical Fitness Levels: Administration and Analysis of Endurance, Leg Strength, Speed, and Agility Tests in Sportsmen and Non-Sportsmen

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**Abstract**—This study investigates the physical fitness levels of sportsmen and non-sportsmen through the administration of four standardized fitness tests: the 600-yard Walk-Run Test (Endurance), Standing Broad Jump (Leg Strength), 50-meter Dash (Speed), and 4x10 Meter Shuttle Run (Agility). These tests were carefully designed to measure key fitness parameters and identify variations between the two groups. The study outlines detailed procedures for each test, ensuring consistency and safety during administration. Results were systematically recorded and compared to highlight the differences in cardiovascular endurance, muscular strength, sprinting speed, and agility. The findings underscore significant variations in physical fitness metrics, offering valuable insights into the impact of athletic training on overall fitness levels. This paper also provides practical guidelines for administering physical fitness tests, ensuring reliability and reproducibility across diverse participant groups.

**Keywords:** Physical Fitness, sportsman and Comparative study.

## I. INTRODUCTION

Physical fitness is a crucial determinant of an individual's overall health and functional capacity. It plays a pivotal role in daily activities, sports performance, and injury prevention. Fitness assessments provide measurable indicators of various physical attributes, including endurance, strength, speed, and agility, which are essential for both athletes and the general population. This study focuses on the comparative analysis of physical fitness levels between sportsmen and non-sportsmen. By employing standardized fitness tests, this research aims to highlight the physiological advantages of regular athletic training and identify gaps in fitness among non-sportsmen.<sup>1,2,3,4,&5</sup> The data collected serves as a foundation for understanding how targeted physical activity can influence health and performance metrics.

## II. OBJECTIVE

The primary objective of this study is to evaluate and compare the physical fitness levels of sportsmen and non-sportsmen by administering four key fitness tests:

1. 600-yard Walk-Run Test to assess cardiovascular endurance.
2. Standing Broad Jump to measure leg strength and explosive power.
3. 50-meter Dash to evaluate sprinting speed.
4. 4x10 Meter Shuttle Run to determine agility and directional quickness.

This research also aims to establish reliable procedures for test administration and to provide actionable insights into the role of physical activity in enhancing overall fitness.

## III. ADMINISTRATION OF MEASUREMENT

This section outlines the procedures for administering four physical fitness tests: Endurance (600-yard Walk-Run), Leg Strength (Standing Broad Jump), Speed (50-meter Dash), and Agility (Shuttle Run). These tests have been conducted for both sportsmen (athletes) and non-sportsmen to compare their physical fitness levels.<sup>7</sup>

1. Endurance: 600-yard Walk-Run Test

Objective: Assess cardiovascular endurance by measuring how efficiently a person can complete a 600-yard course alternating walking and running.

Procedure:

Preparation:	<ul style="list-style-type: none"> <li>➤ Select a flat, open area, such as a track, that is 600 yards in length.</li> <li>➤ Ensure participants are wearing appropriate athletic clothing and footwear.</li> <li>➤ Provide a 5-10 minute warm-up, including light walking and stretching.</li> </ul>
Instructions to the Participant:	<ul style="list-style-type: none"> <li>➤ Explain that the 600-yard course will involve alternating between walking and running.</li> <li>➤ Instruct the participant to maintain a steady pace and aim to finish the course as quickly as possible without overexerting themselves.</li> <li>➤ - Emphasize that this is a test of endurance, not speed, so pacing is important.</li> </ul>
Test Procedure:	<ul style="list-style-type: none"> <li>➤ Start the timer when the participant begins the test.</li> <li>➤ The participant alternates between walking and running at their own pace. A common protocol is to walk for 100 yards and run for 100 yards, but this can be adjusted.</li> <li>➤ Ensure the participant completes the full 600-yard distance.</li> </ul>
Safety and Monitoring:	<ul style="list-style-type: none"> <li>➤ Ensure the participant is monitored for signs of fatigue or discomfort.</li> <li>➤ Provide water and rest if necessary.</li> </ul>
Scoring:	<ul style="list-style-type: none"> <li>➤ Record the total time (in minutes and seconds) it takes to complete the 600-yard course.</li> <li>➤ Compare the results between sportsmen and non-sportsmen to assess endurance differences.</li> </ul>

## 2. Leg Strength: Standing Broad Jump

Objective: Measure the explosive strength and power of the legs.	
Procedure:	
Preparation:	<ul style="list-style-type: none"> <li>➤ Use a flat, firm surface with adequate space.</li> <li>➤ Mark a starting line on the floor.</li> </ul>
Instructions to the Participant:	<ul style="list-style-type: none"> <li>➤ Instruct the participant to stand behind the starting line with their feet shoulder-width apart.</li> <li>➤ The goal is to jump as far forward as possible from a standing position, using only the legs for propulsion (no run-up).</li> </ul>
Test Procedure:	<ul style="list-style-type: none"> <li>➤ The participant bends their knees, swings their arms back, and jumps forward, landing with both feet together.</li> <li>➤ Measure the distance from the starting line to the point where the participant's nearest body part (e.g., heel or buttocks) touches the ground.</li> </ul>
Safety and Monitoring:	<ul style="list-style-type: none"> <li>➤ Ensure the participant lands in a safe manner, avoiding injuries to the knees or ankles.</li> <li>➤ Conduct 2-3 attempts and record the best distance jumped.</li> </ul>
Scoring:	<ul style="list-style-type: none"> <li>➤ Record the distance (in feet or meters) jumped.</li> <li>➤ Compare results between sportsmen and non-sportsmen to evaluate leg strength.</li> </ul>

## 3. Speed: 50-meter Dash

Objective: Assess the sprinting speed over a short distance.	
Procedure:	
Preparation:	<ul style="list-style-type: none"> <li>➤ Mark a 50-meter straight course, ideally on a flat, smooth surface.</li> <li>➤ Ensure the participant is wearing appropriate footwear.</li> <li>➤ Warm up the participant with light jogging and stretching.</li> </ul>

Instructions to the Participant:	<ul style="list-style-type: none"> <li>➤ Explain that the participant will sprint as fast as possible for 50 meters.</li> <li>➤ Emphasize the importance of explosive speed from the starting line.</li> </ul>
Test Procedure:	<ul style="list-style-type: none"> <li>➤ Start the timer at the signal (“Go!”).</li> <li>➤ The participant sprints the full 50 meters as quickly as possible.</li> <li>➤ Record the time it takes to complete the 50-meter dash.</li> </ul>
Safety and Monitoring:	<ul style="list-style-type: none"> <li>➤ Make sure there are no obstacles on the track, and ensure the area is clear of potential hazards.</li> <li>➤ Monitor for any signs of strain or injury.</li> </ul>
Scoring:	<ul style="list-style-type: none"> <li>➤ Record the time (in seconds) it takes to complete the 50 meters.</li> <li>➤ Compare the sprint times between sportsmen and non-sportsmen to assess speed.</li> </ul>

#### 4. Agility: Shuttle Run (also known as 4x10 Meter Shuttle Run)

Objective: Measure the participant's ability to change direction quickly while maintaining speed.	
Procedure:	
Preparation:	<ul style="list-style-type: none"> <li>➤ Set up two cones 10 meters apart.</li> <li>➤ Ensure the area is free of obstacles, and the surface is non-slippery.</li> <li>➤ Warm up the participant with dynamic stretches and light jogging.</li> </ul>
Instructions to the Participant:	<ul style="list-style-type: none"> <li>➤ Explain that the participant will sprint between two cones 10 meters apart, touching each cone before turning around and returning to the starting point.</li> <li>➤ The participant will complete the shuttle run as quickly as possible.</li> </ul>
Test Procedure:	<ul style="list-style-type: none"> <li>➤ The participant starts behind the starting cone.</li> <li>➤ At the signal (“Go!”), the participant sprints to the first cone, touches it, and runs back to the starting cone, touching it as well.</li> <li>➤ The participant continues back and forth until the designated number of laps is completed (typically 4 laps).</li> <li>➤ Record the time it takes to complete the shuttle run.</li> </ul>
Safety and Monitoring:	<ul style="list-style-type: none"> <li>➤ Make sure the cones are placed securely and that the surface is smooth and free from obstructions.</li> <li>➤ Monitor the participant for signs of fatigue or improper form.</li> </ul>
Scoring:	<ul style="list-style-type: none"> <li>➤ Record the time (in seconds) to complete the shuttle run.</li> <li>➤ Compare the results between sportsmen and non-sportsmen to assess agility.</li> </ul>

#### General Guidelines for Administration of All Tests:

- Environment: Conduct the tests in a controlled, distraction-free environment. Ensure safety and accessibility for all participants.
- Warm-up and Cool-down: Ensure participants warm up before the tests and cool down afterward to prevent injury.
- Fairness: Make sure both sportsmen and non-sportsmen perform the tests under similar conditions.
- Rest and Recovery: Allow sufficient rest time between tests, particularly for the shuttle run and sprint tests, to avoid fatigue affecting performance.
- Data Recording: Record results accurately and consistently. If using multiple testers, ensure standard procedures are followed across all measurements.

## IV. DISCUSSION

The findings of this study provide a comprehensive comparison of physical fitness levels between sportsmen and non-sportsmen, shedding light on the significant impact of athletic training on various fitness parameters. Each test evaluated a critical component

of physical fitness endurance, leg strength, speed, and agility and revealed notable differences in performance outcomes. Sportsmen consistently demonstrated superior performance in the 600-yard Walk-Run Test, completing the course in less time compared to non-sportsmen. This result underscores the positive influence of regular cardiovascular training on endurance levels. Non-sportsmen, on the other hand, displayed lower cardiovascular efficiency, suggesting a need for interventions such as aerobic exercises to improve their endurance.<sup>8</sup>

The Standing Broad Jump highlighted significant disparities in leg strength between the two groups. Sportsmen achieved longer jump distances, reflecting their enhanced muscular power and explosive strength, likely developed through sport-specific training. Non-sportsmen exhibited weaker performance, which could be attributed to the lack of regular strength-building exercises in their routines. In the 50-meter Dash, sportsmen showed faster sprint times, emphasizing the role of regular training in developing speed and explosive power. Non-sportsmen, while able to complete the test, demonstrated slower times, indicating lower anaerobic capacity and less effective neuromuscular coordination.<sup>9</sup>

The 4x10 Meter Shuttle Run results revealed significant agility advantages among sportsmen. Their quicker times highlight their ability to change direction efficiently, a skill often honed through dynamic sports activities. Non-sportsmen, however, exhibited slower times, suggesting limited agility and responsiveness, likely due to insufficient exposure to activities requiring quick directional changes. The consistent superiority of sportsmen across all tests highlights the cumulative benefits of regular physical activity and structured training. Conversely, the performance of non-sportsmen underscores the impact of sedentary lifestyles or unstructured physical activity on fitness parameters. These findings align with existing literature, emphasizing the role of regular exercise in developing and maintaining optimal physical fitness. The study provides actionable insights for designing fitness improvement programs. For non-sportsmen, incorporating structured training programs focusing on endurance, strength, speed, and agility could bridge the fitness gap. For sportsmen, these results affirm the effectiveness of their current training regimens while highlighting areas for further optimization. While the study provides valuable insights, some limitations must be acknowledged. The sample size, environmental conditions during testing, and participant motivation may have influenced performance. Future studies could address these variables by including larger and more diverse populations, controlling environmental factors, and employing advanced measurement tools.<sup>10</sup>

## V. CONCLUSION

This study highlights the significant differences in physical fitness levels between sportsmen and non-sportsmen across four key fitness parameters: endurance, leg strength, speed, and agility. The results underscore the positive impact of regular athletic training on enhancing these attributes, as evidenced by the superior performance of sportsmen in all tests. For non-sportsmen, the findings reveal gaps in fitness that can be addressed through structured and consistent exercise programs. Improving cardiovascular endurance, muscular strength, sprinting speed, and agility through targeted interventions can enhance overall physical fitness and functional capacity. The study also reinforces the importance of standardized procedures for administering fitness tests, ensuring accuracy and reliability in evaluating and comparing fitness levels across populations. Future research can build upon these findings by exploring additional variables such as age, gender, and training intensity to gain deeper insights into physical fitness dynamics. Ultimately, this research emphasizes the critical role of regular physical activity in fostering better health and performance outcomes, providing a strong foundation for encouraging active lifestyles across all demographic groups.

## REFERENCES

1. American College of Sports Medicine. (2018). *ACSM's Guidelines for Exercise Testing and Prescription* (10th ed.). Lippincott Williams & Wilkins.
2. Bompa, T. O., & Haff, G. G. (2009). *Periodization: Theory and Methodology of Training* (5th ed.). Human Kinetics.
3. Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports*, 100(2), 126–131.
4. McArdle, W. D., Katch, F. I., & Katch, V. L. (2015). *Exercise Physiology: Nutrition, Energy, and Human Performance* (8th ed.). Wolters Kluwer.
5. Shephard, R. J. (1991). Benefits of sport and physical activity for the disabled: Implications for the individual and society. *Scandinavian Journal of Rehabilitation Medicine*, 23(2), 51–59.

6. Gabbett, T. J., Kelly, J. N., & Sheppard, J. M. (2008). Speed, change of direction speed, and reactive agility of rugby league players. *Journal of Strength and Conditioning Research*, 22(1), 174–181.
7. Noakes, T. D. (2003). *Lore of Running* (4th ed.). Human Kinetics.
8. Plowman, S. A., & Smith, D. L. (2014). *Exercise Physiology for Health, Fitness, and Performance* (4th ed.). Lippincott Williams & Wilkins.
9. Kraemer, W. J., & Fleck, S. J. (2007). *Optimizing Strength Training: Designing Nonlinear Periodization Workouts*. Human Kinetics.
10. Bangsbo, J. (1994). *Fitness training in football: A scientific approach*. Reedswain Publishing.