



ISSN: 2456-4419

Impact Factor: (RJIF): 5.88

Yoga 2026; 11(1): 78-80

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www.theyogicjournal.com

Received: 10-11-2025

Accepted: 12-12-2025

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Analysis of flexibility and agility differences among students of public and private schools

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DOI: <https://www.doi.org/10.22271/yogic.2026.v11.i1b.1867>

Abstract

Background: Flexibility and agility are critical components of physical fitness that play a vital role in children's motor development, injury prevention, and overall athletic performance. However, disparities in school environments may influence these fitness attributes, with private schools often providing better infrastructure and structured physical education compared to public schools.

Purpose: This study aimed to analyze and compare flexibility and agility among students from public and private schools to determine whether educational settings significantly affect these motor abilities.

Methods: A cross-sectional design was adopted involving 100 students aged 13-16 years (50 from public schools and 50 from private schools). Flexibility was assessed using the Sit-and-Reach Test, while agility was measured using the Illinois Agility Test. Descriptive statistics were calculated, and independent samples *t*-tests were applied to identify differences between groups at a significance level of *p* < 0.05.

Results: Private school students demonstrated higher mean flexibility (24.12 ± 3.45 cm) compared to public school students (21.48 ± 3.62 cm), and faster agility times (17.82 ± 1.09 sec) than public school students (18.65 ± 1.21 sec). Independent samples *t*-test results confirmed these differences to be statistically significant for both flexibility ($t(98) = -3.56, p = 0.001$) and agility ($t(98) = 3.21, p = 0.002$).

Conclusion: The findings suggest that private school students outperform public school students in both flexibility and agility, likely due to differences in training opportunities, sports infrastructure, and structured physical education programs. These results emphasize the need for strengthening physical education and sports initiatives in public schools to promote balanced motor development among adolescents.

Keywords: Flexibility, Agility, Motor fitness, Public schools, Private schools, Physical education

Introduction

Physical fitness is acknowledged as a multifaceted concept that encompasses physiological, motor, and performance-related elements, each essential for sustaining health and functional capability. In this context, flexibility and agility are especially crucial for the physical growth and motor development of children and adolescents. Flexibility, characterized as the capacity of a joint or a set of joints to move fluidly within an unimpeded range of motion, is crucial for alleviating muscle tension, averting injuries, and improving general mobility (Wells & Dillon, 1952) ^[6]. Agility denotes the capacity to swiftly and efficiently alter bodily position or direction in reaction to environmental stimuli (Sheppard & Young, 2006) ^[4]. Collectively, these motor skills enhance sports performance and empower children to engage confidently in everyday physical activities, promoting long-term health and well-being. (Rathore and Chandel, 2023 ^[7]) The significance of flexibility and agility transcends athletic performance. Sufficient flexibility aids in sustaining postural equilibrium and musculoskeletal well-being, whilst elevated agility correlates with enhanced coordination, response time, and neuromuscular regulation. During adolescence, characterized by fast physical growth, deficiencies in these areas might heighten vulnerability to musculoskeletal injuries and diminish overall physical capability. Thus, evaluating and contrasting flexibility and agility among various student demographics yields significant insights into their developmental condition and emphasizes potential deficiencies in fitness training initiatives. (Rathore and Chandel, 2023) ^[7]

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The educational environment is recognized as a significant factor in the physical development of children and teenagers. Schools offer academic instruction and function as a venue for organized physical exercise via physical education (PE) programs and extracurricular sports. Nonetheless, the resources and possibilities offered by educational institutions differ significantly. Private schools may possess enhanced sports facilities, qualified physical education instructors, and a heightened focus on extracurricular activities, perhaps facilitating improved motor skill development. (Rathore *et al.*, 2024) [8] Conversely, public schools, particularly in resource-limited regions, may have challenges due to inadequate facilities, poorly organized physical education programs, and a scarcity of qualified personnel, which might result in diminished flexibility and agility performance among their pupils (Gupta & Pandey, 2018) [2].

Numerous research have highlighted the impact of socio-economic conditions, educational infrastructure, and instructional quality on students' physical fitness levels (Tomkinson *et al.*, 2019). These gaps highlight the necessity for comparative study to evaluate whether educational environments produce quantifiable variations in essential fitness components, including flexibility and agility. These findings can assist policymakers, educators, and curriculum architects in creating targeted interventions to close fitness disparities and provide fair opportunities for physical development. (Rathore *et al.*, 2024) [8]

Against this background, the present study seeks to compare flexibility and agility among students of public and private schools. By doing so, it aims to evaluate whether the educational setting significantly affects these motor abilities and to provide evidence-based recommendations for enhancing school-based physical education programs.

Objectives of the Study

1. To assess the flexibility of students from public and private schools.
2. To assess the agility of students from public and private schools.
3. To compare the differences in flexibility and agility between the two groups.

Hypotheses

- **H₀₁:** There is no significant difference in flexibility among students of public and private schools.
- **H₀₂:** There is no significant difference in agility among students of public and private schools.

Methods and Materials

Sample

The research comprised 100 kids aged 13 to 16 years, evenly divided between 50 pupils from public schools and 50 from private institutions. The purposive sampling approach was employed. All participants were medically healthy and actively involved in school-based physical activities. Students with musculoskeletal ailments or conditions that impair motor performance were excluded.

Tools and Tests

1. Sit-and-Reach Test - to assess flexibility of the hamstring and lower back muscles (Wells & Dillon, 1952) [6].
2. Illinois Agility Test - to measure agility, involving rapid changes of direction while running (Getchell, 1979) [1].
3. Measuring Instruments - sit-and-reach box, stopwatch, and cones.

Procedure

Prior to data collection, authorization was secured from school officials, and informed consent was acquired from both parents and kids. Every student executed a 10-minute warm-up preceding the test trials. The sit-and-reach test necessitated that participants sit with their legs extended and reach forward to the maximum distance, with the best of three tries measured in cm. In the Illinois Agility Test, students navigated a standardized course that required sprints and directional changes around cones, with their performance measured using a timer. All assessments were performed under comparable settings for both groups.

Statistical Procedure

Descriptive statistics, including mean and standard deviation, were calculated for flexibility and agility scores. Independent samples t-tests were applied to compare the differences between public and private school students. The level of significance was set at $p < 0.05$. Data were analyzed using SPSS (Version 20.0).

Results

Table 1: Descriptive Statistics for Flexibility and Agility

Variable	Group	N	Mean	SD
Flexibility (cm)	Public School	50	21.48	3.62
	Private School	50	24.12	3.45
Agility (sec)	Public School	50	18.65	1.21
	Private School	50	17.82	1.09

The descriptive data reveal considerable disparities in flexibility and agility across pupils from public and private schools. Regarding flexibility, private school students attained a mean score of 24.12 cm with a standard deviation of 3.45, while public school students reported a lower mean score of 21.48 cm with a standard deviation of 3.62. This indicates that private school pupils, on average, had superior range of motion and flexibility compared to their public-school peers. In terms of agility, private school students outperformed their public school counterparts, achieving a mean completion time of 17.82 seconds with a standard deviation of 1.09, whereas public school students recorded a mean time of 18.65 seconds with a standard deviation of 1.21. Lower agility scores indicate superior performance; thus, these results suggest that private school students exhibit enhanced flexibility, quickness, and efficiency in directional changes, likely due to variations in training, infrastructure, and the emphasis on physical education among different school types.

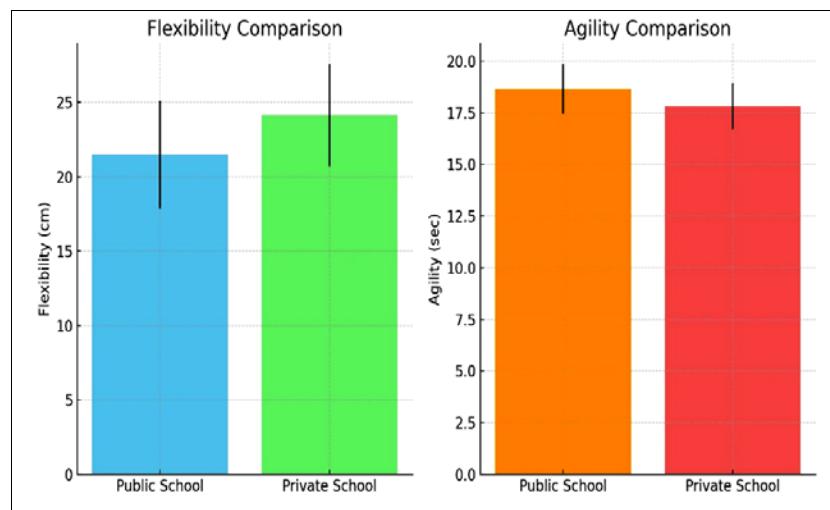


Fig 1: Comparison of Flexibility and Agility between Public and Private Schools

Table 2: Independent Samples t-Test Results

Variable	Mean Difference	t-value	df	p-value
Flexibility	-2.64	-3.56	98	0.001*
Agility	0.83	3.21	98	0.002*

(p< 0.05 = significant)

The independent samples t-test indicated significant differences in flexibility and agility between pupils from public and private schools. The mean difference for flexibility was -2.64 cm, signifying that private school students had superior flexibility scores relative to their public school peers. The t-value of -3.56, with 98 degrees of freedom and a p-value of 0.001, indicated that this difference was statistically significant. The mean difference in agility was 0.83 seconds, indicating that public school students required more time to complete the agility test, while private school students exhibited greater agility by performing more swiftly. The t-value of 3.21, accompanied with 98 degrees of freedom and a p-value of 0.002, demonstrated that this difference was statistically significant. These data indicate that private school students surpass public school students in flexibility and agility, perhaps owing to superior training opportunities, sports facilities, and organized physical education programs.

Discussion

The study's results demonstrate that private school students outperformed public school students in both flexibility and agility assessments. The findings align with prior research indicating that access to organized physical education programs, qualified coaches, and extracurricular sports activities significantly impacts the development of motor performance skills (Tomkinson *et al.*, 2019). Private schools frequently prioritize athletics within their curriculum, offering kids consistent opportunity for flexibility, conditioning, and agility training. Conversely, public schools may have constraints such as insufficient infrastructure and diminished focus on organized physical exercise, thus explaining the inferior flexibility and agility results. Ortega *et al.* (2008) emphasized that fitness components, including agility and flexibility, are significantly influenced by the frequency and quality of physical exercise, hence corroborating the noted disparities.

The ramifications of these findings underscore the necessity of enhancing physical education programs in public schools. Integrating consistent stretching sessions, agility exercises, and organized athletic activities may facilitate the convergence of public and private school pupils. Policymakers and school administrators must emphasize fair

access to fitness resources to foster balanced physical development across various educational environments.

Conclusion

This study concludes that private school students possess significantly better flexibility and agility than public school students. These differences may be attributed to disparities in school resources, physical education programs, and extracurricular opportunities. Addressing these gaps through targeted interventions in public schools can promote more equitable fitness development among students.

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