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# AN INVESTIGATION ON AGILITY COMPARISON AMONG STUDENTS IN EDUCATIONAL INSTITUTIONS

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**KEYWORDS**

Investigation, Agility Comparison, Students & Educational Institutions

**ABSTRACT**

The aim of this study was to examine and compare the agility scores of two groups of students. Sample selection was performed using random sampling method. The Shuttle Run test was utilized as the data collection instrument in accordance with standard protocols. Shuttle Run test is widely recognized and valid measure of the agility that involves participants running back and forth between two points in a timed fashion. Following the data collection phase, a t-test was employed to analyze the results and determine if there was significant difference in agility scores between two groups of students. The study's findings revealed a statistically significant difference in the agility scores between two groups ($p < .001$). Normality test was conducted to assess whether the data met the assumptions of normality. The results indicated that the data were normally distributed, thereby providing evidence of the study's reliability and validity. Findings suggest that students demonstrated superior agility skills compared to their counterparts. The results could inform educators & policymakers in developing targeted interventions to enhance the agility skills of students for promoting better physical fitness and health outcomes.



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## INTRODUCTION

The definition of agility has been widely debated for a very long time (Milani, Setti, & Argentero, 2021). Most people concur that it relates to capacity to alter course swiftly and correctly (Yemataw, 2022; Barrow & McGee, 1971). Additionally, some believe it to be just the capacity to shift course swiftly (Gren, & Lenberg, 2020; Bloomfield, Ackland & Elliot, 1994). Coaches and athletes place a high emphasis on the ability to quickly and agilely change movement patterns and directions in a variety of sports, including court, field, and combat sports (Bourgeois et al., 2017). This is regarded as a positive quality. Agility is ability to move in reaction to an outside stimulation, such as a ball

or another person (Sekulic, Zeljko, Pehar, Corluka & Modric., 2022; Sheppard & Young, 2006). According to authors, agility includes the ability to quickly shift your body's orientation as well as your limbs (Baechle, 1994; Latash, 2022). This type of activity involves the use of open skill tasks need to be quickly and exactly performed. Agility is a highly valued quality that can contribute to success in sports. Thieschäfer and Büsch (2022), it is critical factor when it comes to performing open-skill sports effectively. Strength and conditioning coaches recognize importance of fostering agility competencies in young people (Burton, Eisenmann, Lloyd & Till, 2021). So, they are actively working to develop them.

In today's ever-evolving physical activities and sports, agility is an important skill that often gets overlooked. Authors in more recent years have broadened their definition of agility is the capacity for quick movements and orientation changes of limbs as well as the entire body. In order to improve skills and abilities through infancy and adolescence, agility is incorporated into long-term athletic development models (McBurnie et al., 2021). This recognition has allowed for its widespread use in field of sports. Agility has been recognized as essential for peak performance in multiple situations. To complicate matter, additional terms like 'quickness' have been introduced too (Baran & Woznyj, 2020; Baker, 1999). Quickness is often confused with agility and quickness of direction change. It was initially defined by Moreno (1995) as combination of acceleration, explosiveness, reactiveness which covers multiple planes/directions (Milani, Setti & Argentero, 2021). Quickness entails both acceleration and cognitive and physical reflexivity. If this is a distinguishable bodily characteristic, one might conclude quickness is part of agility (Moreno, 1995). Quickness, as defined by leading experts in the field of physical performance, is ability to respond quickly to stimuli both mentally and physically. It is marked by explosive acceleration and an increased capacity for cognitive and physical reactions.

This definition suggests that quickness is the distinct physical quality that can be identified and improved upon through practice and training. As such, it could provide athletes with greater levels of agility, speed and overall performance on the field or court. Although agility does not take into account deceleration or changing direction, there are numerous studies and tests that involve these elements and are part of quickness drills (Cabo, Rey, Kalén, & Costa, 2020; Baker, 1999; Moreno, 1995). Quickness has grown to be popular and common word in North American sports, generating multiple discussions and seminars focused on preparing trainers and athletes. The word "quickness" is frequently used online when discussing field sport competitors' training regimens. Although, the quickness's precise definition is ambiguous, the current article will avoid using it because of its ambiguous nature. Quickness is an often-used term on the internet, especially with regard to sports athletes' training regimens. Precise meaning of speed is not always clear; still, its use is becoming more and more common. Quickness can refer to a variety of skills such as agility, speed, and reflexes. With proper training techniques, athletes can develop these skills which will help them perform better in their respective sport. When it comes to training athletes in field sports, word 'quickness' is often employed.

It is difficult to put into words its exact meaning, but its implications are too ambiguous. Besides that, the phrase 'cutting' has also been utilized to describe changes in directions during a sprint

(Bernier, 2003; Marques, Paul, Graham-Smith, & Read, 2020). Unlike speed, cutting refers to the particular step in changing direction wherein an athlete's foot meets the ground to start the change. Young, James and Montgomery (2002) explored how agility in sports like football are defined. They studied the multiple elements that contribute to agility. Primarily, the authors pointed out that agility is made up of two components, namely the speed of making directional changes and perceptual and decision-making elements (Šimonek, 2019). Despite the widely acknowledged importance of agility for sports performance, Lloyd and Oliver (2012), Moffa, et, al., (2020) claimed that "agility is undoubtedly one of most under-researched fitness components within the pediatric literature. Agility is an important factor for sports performance, yet it is vastly under-researched in comparison to other fitness components. This is evidenced by Lloyd and Oliver's (2012), Moffa, et, al., (2020) statement that " Perhaps one of the least studied aspects of fitness is agility." While there have been some studies on agility, its impacts on sports performance require further study in order to be better understood.

## LITERATURE REVIEW

Agility is a multidimensional concept that refers to an individual's ability to quickly and efficiently adapt to changing situations and environments (Walter, 2021). It is a critical component of athletic performance, particularly in sports that require rapid changes in direction, speed, and coordination (Horníková, & Zemková, 2021). This paper will discuss importance of agility in sports performance, its definition, and how to measure agility. Agility in sports refers to an athlete's ability to move quickly and efficiently while maintaining balance, coordination, and control. It is essential for the athletes who compete in sports that require frequent changes in direction, like soccer, basketball, and football. In these sports, agility allows athletes to quickly evade defenders or change direction to avoid obstacles and move towards the goal (Dewangga Yudhistira, 2020). In this connection, the agility is an important component of athletic performance, as it can impact an athlete's ability to compete at a high level. It allows athletes to quickly and efficiently adapt to changing situations and environments, which is crucial in sports where the competition is unpredictable (Mota, Afonso, Sá, & Clemente, 2022). Consequently, athletes who have higher agility levels are more likely to perform well in their respective sports and may have a competitive advantage over their opponents (Mackala, et, al., 2020).

### Factors Affecting Agility

1. Neuromuscular Factors: Neuromuscular factors like muscle strength, power and direction are crucial for agility performance. Strong and coordinated muscles can help an athlete change direction quickly and efficiently (Irandoust & Jami, 2022).
2. Body Composition: Body composition, including factors such as height, weight, and body fat percentage, can impact agility performance. Athletes with lower body fat percentage and a higher muscle-to-fat ratio may have advantage in agility-based activities (Subak, et, al., 2022).
3. Training and Practice: Training and practice can significantly influence an athlete's agility performance. Specific training programs, such as plyometric and agility-based training, can improve an athlete's agility performance by enhancing neuromuscular factors and body composition (Shamshuddin, Hasan, Mohamed & Razak, 2020).

4. Age and Maturation: Age and maturation can also influence agility performance. Younger athletes may have better agility due to their lighter body weight and greater flexibility, while older athletes may have better agility due to practice and improved neuromuscular control (Ondra & Svoboda, 2020).
5. Psychological Factors: Psychological factors like motivation, confidence and concentration can influence agility performance. Athletes with high levels of motivation and confidence may be more likely to perform well in the agility-based activities (Lu, & Li, 2022; Nadhira Putri, & Mangundjaya, 2020).
6. Environmental Factors: Environmental factors such as playing surface, weather conditions, and lighting can also impact agility performance. Athletes may need to adjust movements and technique to perform optimally in different environment (Paolo, Nijmeijer, Bragonzoni, Gokeler, & Benjaminse, 2022).

Agility performance is influenced by combination of factors, including neuromuscular factors, body composition, training and practice, age and maturation, psychological factors, and environmental factors. Coaches and athletes consider factors when developing training programs and strategies to improve agility performance that is crucially required for comprehending situations and realizing strategic outcomes.

### Measuring Agility

The agility can be measured using various tests and methods, depending on the specific sport or activity. Here are some of the most commonly used tests to measure agility, along with the latest references:

1. 5-10-5 Shuttle Run: The 5-10-5 shuttle run, also known as the pro agility test, is a common test used to measure agility in sports such as football, soccer, and basketball. The test involves running around cones arranged in "T" shape, with the athlete starting in the middle and sprinting 5 yards to one side, then changing direction and sprinting 10 yards in the opposite direction, and finally changing direction again and sprinting 5 yards back to the middle (Barber-Westin, & Noyes, 2019).
2. Illinois Agility Test: Illinois agility test is another commonly used test to measure agility in sports such as soccer, basketball, and tennis. The test involves running through a series of cones arranged in the specific pattern, including forward sprints, the lateral shuffles, and backpedaling (Cao, Zhang, Guo, Zhang, & Wang, 2020).
3. T-Test: The T-test is a widely used agility test that involves running around cones arranged in a "T" shape, with the athlete starting at the base of the T and running forward to touch a cone, then shuffling sideways to touch another cone, and finally backpedaling to touch the starting cone (Hribernik, Kež, Umek, & Kos,2021).
4. Hexagon Test: Hexagon test is commonly used assessment for measuring agility, especially in team sports such as soccer and basketball. In this test, an athlete must move in and out of a hexagon shape as quickly as possible, while reacting to visual or auditory cues. This test measures athlete's ability to change direction quickly, while also processing and reacting to external stimuli (Hernández, et, al., 2021).

## RESEARCH METHODOLOGY

The study population consisted of all students from Government High School (GHS) Daraban Khurd, Dera Ismail Khan. Studying in 8th grade and 10th grade. The participants were all boys. The age range of the students was not specified. The study was conducted at the GHS Daraban Khurd in Dera Ismail Khan, Pakistan. Thus, no further demographic information was provided about the interested participants. These methods and procedures along with relevant tools and techniques are important in managing the respondents' responses regarding the research issues and reaching the desired conclusion.

### Sampling Method

The study used random sampling method to select the participants from 8th and 10th grade classes at Government High School Daraban Khurd, Dera Ismail Khan. Random sampling is a method of selecting representative sample from larger population by using a random process. In this case, the students were selected using a random number generator or a similar a way to make sure the sample was representative of entire student population in 8th and 10th grades at the school. The objective of using random sampling was to reduce the potential for selection bias and ensure that the results of the study were representative of the larger population of students in order to collect and analyze their responses.

### Shuttle Run Test

This test measures agility and speed is used in Canada fitness test (Mathews, 1978), International Physical Fitness Test (Rosandich, 2008), Singapore's National Physical Fitness Award (MOE, 2014), Safdar and Khan Physical Fitness test (Luqman, 2016) and National Fitness Test Program in Peoples' Republic of China (Deng, Huang, Deng, & Qu, 2003). The agility test involves individual running back and forth between two lines that are 10 meters apart. The starting line is positioned opposite to two objects, such as wooden blocks, which are placed behind one of the lines. Participant starts at the line opposite to the blocks and, on command "ready? Go!", rushes to the other line to grab a block, brings it back to place it behind starting line, and repeats this process with the second block. The time it takes to complete the task is recorded in seconds and milliseconds. The Shuttle Run test was performed according to standard protocols, and necessary equipment was provided for the students to complete the test. The results of Shuttle Run test were recorded and used as the primary source of data for the study.

### Statistical Analysis

The data collected from the Shuttle Run test was analyzed using a t-test. The t-test is a statistical test used to compare the means of two independent groups, in this case, the 8th and 10th grade students. In order to establish whether there was a significant difference in agility scores between the two groups, the t-test was used. The t-test was chosen for its ability to handle small sample sizes, and because it provides information about the significance of the difference in means between the two groups. In this connection, the outcomes of t-test were used to draw the conclusions about comparison of agility between the 8th and 10th grade students, and to determine if further research is needed in this area.

## RESULTS OF STUDY

The results of study have been produced in this section with the aim to examine the main issues statistically thereby offering the desired information that further helped in reaching the desired and required conclusion.

Table 1 Results of Independent Samples T-Test and Group Descriptives

| Group | Statistic | df | P | MD | SED | ES | N | Mean | Median | SD | SE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Shuttle Run | Student-t | 26.0 | < .001 | -1.81 | 0.353 | -1.94 | 14 | 10.8 | 10.6 | 0.715 | 0.191 |
| Shuttle Run | | | | | | | 14 | 12.6 | 12.4 | 1.11 | 0.297 |

**Note:** A low p-value suggests a significant difference between the means of the two groups.

Table 2 Results of Normality Test (Shapiro-Wilk)

| Group | Test Statistic (W) | P |
|---|---|---|
| Shuttle Run | 0.929 | 0.06 |

The results of t-test showed that the mean score of the 8th grade students was 10.58 seconds, while the mean score of the 10th grade students was 12.45 seconds. The p-value for the t-test was .001, which indicated that the difference in means between the two groups was statistically significant. This means that there is strong evidence to suggest that the 8th grade students were more agile than the 10th grade students. Based on these results, it can be concluded that the 8th grade students were significantly more agile than 10th grade students. These results provide valuable insights into the physical fitness levels of students and can inform development of physical fitness programs aimed at improving agility.

## DISCUSSION

The results of the study indicate that 8th grade students were significantly more agile than 10th grade students, as evidenced by their lower mean scores in the Shuttle Run test. The results of the t-test, with a p-value of .001, provide the strong evidence to support this conclusion. These results contribute to the understanding of the physical fitness levels of students and the changes that occur during the school years. Higher standard scores are found in president physical fitness test, a 40-yard shuttle run test with five items, compared to current research. The distance of the run, which differs between the President Fitness Test's shuttle run distance of 40 yards and the current study's shuttle run distance of 40 meters, is the primary source of timing discrepancy. Other factors could include the surroundings, governmental structure, diet, and geographical conditions. The results of the study are in line with study conducted by he found that 10th class students have demonstrated less Agility than the 8th class students (Singh, 2022). Uzun, Akbulut, Erkek, Pamuk and Bozoğlu (2020) also found significant effect of age on agility. The results of current study are also in line with the study conducted by Andrašić et al., (2021) they found that agility is significantly affected by the age of the players.

Molina, Zarzuela, Padilla, Quiñones and Planells, (2020) conducted a research study on handball players and found similar results to current study. A study conducted by Tarnichkova, and Petrova

(2020) showed contrast results to the present study they found poorer results for pupils in the first two years of high school stage of the secondary educational degree (8th and 9th grade). This shows a low level of development of agility and spatial coordination in this age group. In following age periods (10th – 12th grade) there is again tendency to improve the results. One possible explanation for these results is that 8th grade students are in stage of physical development where they are more flexible and able to move quickly and easily. On other hand, 10th grade students may have begun to experience some physical changes that are associated with aging, such as decreased flexibility and slower reaction times, which could affect their agility. It is important to note that the results of this study are based on a small sample size and should be interpreted with caution. The sample was limited to students from one school in DIK, Pakistan, and results may not be representative of other schools or populations. Further research is needed to determine results can be replicated in larger and more diverse samples.

## CONCLUSION

In conclusion, results of this study suggest that 8th grade students are more agile than 10th grade students, but more research is needed to confirm these findings and to understand the underlying reasons for difference. The results of this study have implications for physical education programs and for the development of interventions aimed at improving physical fitness of students. However, it is important to note that this study has some limitations. The sample size was relatively small, and the study only focused on agility as a measure of physical fitness. Future studies could expand on these findings by including larger and more diverse samples, as well as examining other measures of physical fitness such as strength, endurance, and flexibility. Moreover, while the study suggests that there is a difference in agility between 8th and 10th grade students, further research is needed to understand underlying reasons for this change. It is possible that factors like age, developmental stage, and prior physical activity levels could be influencing results. Nevertheless, the findings of this study have implications for physical education programs and interventions aimed at improving the physical fitness of students. By tailoring physical education programs to specific grade levels and focusing upon developing agility in younger students, it may be possible to improve physical fitness levels in schools. This study provides a starting point for further research and discussion on physical fitness in students.

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