



## Evaluation of Agility and Anthropometric Characteristics in Young Taekwondo Athletes

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**ABSTRACT:** Agility is a key physical component highly valued in team sports and, increasingly, in individual sports. This study aimed to evaluate agility-related physical performance in children practicing taekwondo. Methods: Forty-two boys (mean age: 13–14 years) practicing taekwondo in Tirana, Albania, participated in the study. All participants trained three times per week for 60 minutes and had approximately two years of training experience. Prior to participation, all subjects and their parents/coaches were informed about the study procedures, and written informed consent was obtained. Anthropometric characteristics were recorded, including body height ( $161.2 \pm 5.61$  cm), body weight ( $58.63 \pm 6.45$  kg), and body mass index (BMI:  $20.83 \pm 3.42$  kg/m<sup>2</sup>). Agility performance was assessed using the Zigzag Agility Test (ZAT) and the Shuttle Run ( $10 \times 5$  m). Each test was performed three times, and the best result was retained for analysis. Results: The findings revealed significant inter-individual differences in both agility tests. Additionally, significant differences were observed in anthropometric variables (BMI, height, and weight) among participants ( $p < .05$ ). Conclusion: The results suggest that agility performance in young taekwondo athletes may be influenced by training exposure and physical characteristics. Increased training volume with a focus on skill development may contribute to improvements in agility.

**KEYWORDS:** taekwondo, test, boys, agility

### I. INTRODUCTION

Taekwondo is a relatively new sport in Albania that has developed rapidly over the past five years and is practiced by individuals of different age groups. It is performed on a square area and involves offensive techniques such as kicks and punches directed at the torso and head. Taekwondo matches are characterized by short-duration, high-intensity

actions (1–3 seconds) and frequent rapid changes of direction [1; 2].

Due to the dynamic nature of the sport, technical and motor skills are essential for performance. In particular, agility, strength, and speed of movement are key components required to execute techniques effectively within a limited space. These physical and motor characteristics develop and change during childhood and adolescence [3].

Agility, defined as the ability to change direction quickly and efficiently while maintaining balance and control, is considered a fundamental component in taekwondo performance [4; 5]. It plays a crucial role in executing technical-tactical movements in multiple directions with speed, precision, and coordination.

Several field-based tests have been used to assess agility in sports, including the Illinois Agility Test (IAT), the Zigzag Agility Test, and the T-test, which are considered reliable and effective tools for measuring agility performance [6]. Research has shown that agility performance improves progressively with age, particularly during pre-adolescence [7].

Previous studies have reported significant differences in agility performance across age groups and performance levels in taekwondo athletes. For example, [8] found differences in agility among six age groups ranging from children to adults. Similarly, reported significant differences in agility and lower limb acceleration between U12 and U15 athletes. In addition, higher-level athletes tend to demonstrate better agility-related performance compared to less successful peers [4]. Furthermore, [9] reported strong correlations between skill-related tests across different age categories (U12–U18).

Despite the existing literature, there is limited research focusing on agility performance in young taekwondo athletes in Albania. Therefore, the aim of this study was to evaluate agility performance in children practicing taekwondo.



## II. METHODS

### Participants

Forty-two boys practicing taekwondo in Tirana, Albania, participated in the study (mean age: 13–14 years). All participants trained three times per week for 60 minutes and had approximately two years of training experience.

Prior to participation, the study procedures were explained to the participants and their parents/coaches. Written informed consent was obtained from both the parents and the participants. Anthropometric measurements were recorded, including body height ( $161.2 \pm 5.61$  cm), body weight ( $58.63 \pm 6.45$  kg), and body mass index (BMI:  $20.83 \pm 3.42$  kg/m<sup>2</sup>).

Agility performance was assessed using the Zigzag Agility Test (ZAT) and the Shuttle Run ( $10 \times 5$  m). Each test was performed three times, and the best result was used for analysis.

### Procedure

Participants performed all tests under similar conditions. Each agility test was conducted three times, and the best performance was recorded for further analysis.

**Zigzag Agility Test (ZAT):** Participants ran as fast as possible along a zigzag course marked with cones and tape on the floor (dimensions:  $3 \text{ m} \times 4.85 \text{ m}$ ). The test was repeated twice, and the best time was retained [10].

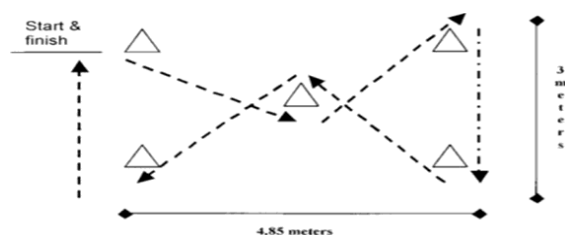


Figure 1. Zigzag Agility Test.

**Shuttle Run ( $10 \times 5$  m):** This test was used to assess speed and agility and is part of the Euro fit test battery. Two lines were marked on the floor at a distance of 5 meters. Upon the command “start,” participants sprinted back and forth between the lines 10 times, ensuring both feet crossed each line. The test was performed three times, and the fastest time was recorded.

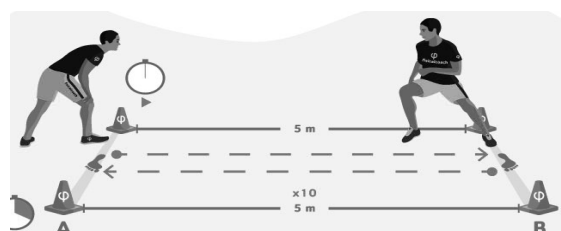


Figure 2. Shuttle Run test  $10 \times 5$  m

### Statistical Analysis

Statistical analysis was performed using IBM SPSS Statistics version 26. Descriptive statistics (mean and standard deviation) were used to summarize the data. Inferential statistical analysis was applied to examine differences between participants. Statistical significance was set at  $p < .05$ .

## III. RESULTS

Descriptive statistics for agility performance and anthropometric characteristics of the participants are presented in Table 1.

Table 1. Means, SD, maximum and minimum of all variables.

	13-14 yrs.		
	Mean $\pm$ SD	Min	Max
Zigzag Agility test(s)	$8.21 \pm 0.8$	6.56	8.33
Shuttle Run $10 \times 5$ m (s)	$19.68 \pm 2.38$	19.38	20.07
Height (cm)	$161.2 \pm 5.61$	155	164
Weight (kg)	$58.63 \pm 6.45$	56	68
BMI	$20.83 \pm 1.83$	17.21	22.05

Table 1 illustrates the values of the eye skill tests of taekwondo players aged 13-14 years. In addition, Table 1 shows the height, weight, and BMI of the athletes and the standard deviation. There were significant differences in between individuals. There were significant differences in BMI, height, and weight between individuals ( $p < .05$ ).

## IV. DISCUSSION

The results of this study showed that children practicing taekwondo demonstrated differences in agility performance, as measured by the Zigzag Agility Test and the Shuttle Run ( $10 \times 5$  m). These findings support the importance of agility as a key physical component in taekwondo, a sport characterized by rapid changes of direction, body control, and quick reactions to opponents.

The observed differences in agility performance may be partially explained by variations



in anthropometric characteristics such as height, body weight, and BMI. During early adolescence, biological maturation is still in progress, and changes in body size and composition can influence motor performance. Athletes with more favourable body proportions and lower relative body mass may perform better in tasks requiring rapid acceleration and directional changes. Previous research has also highlighted the role of anthropometric and biomechanical factors in agility performance.

The present findings are consistent with previous studies in taekwondo, which indicate that agility is not only related to movement speed but also to the ability to react quickly and adapt to changing situations during performance [11]. In combat sports, faster reaction time and efficient changes of direction are essential for achieving high performance. Furthermore, training interventions focusing on agility have been shown to significantly improve performance-related variables. For example, short-term agility training programs (e.g., 6 weeks) have been associated with improvements in speed, balance, reaction time, and anaerobic power. Similarly, SAQ (Speed, Agility, and Quickness) training has been reported to enhance both agility and kicking performance in young athletes [12].

Based on these findings, it is recommended that coaches include specific agility-focused exercises in training programs for young taekwondo athletes. Exercises such as zigzag runs, cone drills, ladder drills, and shuttle runs may contribute to improvements in coordination, balance, and the ability to change direction efficiently.

However, this study has some limitations. The sample included only boys within a specific age group and with similar training experience, which limits the generalizability of the findings to other populations, such as female athletes or different age categories. Future research should examine the influence of gender, age, biological maturation, and training experience on agility performance in taekwondo athletes.

Additionally, previous studies have shown that agility performance improves progressively during childhood and adolescence, with significant development occurring between the ages of 5 and 18 [3]. Differences in agility performance have also been reported between specific age groups, such as 13–14 years [13]. These findings further support the importance of age-related development in agility performance.

Overall, agility remains a fundamental component in taekwondo, contributing to the effective execution of technical-tactical movements

in multidirectional conditions while maintaining balance, speed, and precision.

## V. CONCLUSION

In conclusion, this study demonstrated that children practicing taekwondo show differences in agility performance, which are also associated with anthropometric characteristics such as height, weight, and BMI. Agility appears to be a key component of performance in taekwondo, as it influences the ability to change direction quickly, respond to the opponent, and maintain effective movement control during matches.

Based on these findings, it is recommended that coaches incorporate specific agility-focused exercises into the training programs of young athletes. Furthermore, future research should investigate the influence of factors such as gender, age, biological maturity, and training experience on agility performance in taekwondo athletes

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