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Basic Motor Skills Profile of Badminton Athletes at a Legendary Club in Bandung

"Study on Basic Motor Skills of Athletes Aged 6 – 12 Years SGS PLN Bandung City"

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Abstract

Introduction: The growing popularity of badminton globally underscores the importance of developing basic motor skills from an early age. Components such as speed, agility, balance, coordination, reaction time, and endurance are the main foundations that support an athlete's performance, especially in meeting the technical and physical demands of badminton. **Objectives:** This study aims to identify and describe the basic motor skills profile of 6 – 12 years old badminton athletes at the PB SGS PLN club in Bandung as a basis for evaluating and designing early age training programs. **Method:** This study used a quantitative descriptive approach with a cross-sectional design. The sample consisted of 35 athletes selected through purposive sampling. Basic motor skills were measured using six instruments: 10-meter sprint (speed), zig-zag run (agility), stork stand (balance), ball throw-catch (coordination), ruler drop test (reaction time), and beep test (endurance). **Result:** The results revealed clear differences in each motor skill across age groups. Sprint performance improved from an average of 3.19 s at ages 6–7 to 2.17 s at age 12. Agility scores declined from 9.15 s at ages 6–7 to 6.63 s at age 12, while balance showed steady progress, reaching a maximum of 282 s at age 11. Hand-eye coordination increased from about 15 catches at ages 6–7 to 27–31 catches at ages 10–12. Reaction time also advanced, from 3–4 cm at ages 6–7 to 15–25 cm at ages 10–12. Endurance rose as well, with beep test levels improving from 3–6 to 7–9 by age 12. Overall, older athletes consistently demonstrated stronger performance categories across all motor components compared with younger athletes. **Conclusion:** The study highlights the need for age-appropriate training programs and offers practical guidance for coaches in developing young badminton athlete.

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INTRODUCTION

The BWF Annual Book 2024 states that in 2024, badminton enthusiasts will reach 744 million fans and 384 million active participants. This indicates that interest in badminton is at an all-time high (Borrie et al., 2025). This is also evidenced by the achievements of the badminton competition at Paris 2024, namely the debut of several new countries at the Olympics and Paralympics, as well as an increase in the Paralympic athlete quota from 90 to 120. The Olympic matches were watched by 150,000 spectators, while the 2024 Thomas & Uber Cup set a record of 92,000 spectators (Saparudin, 2025). This achievement reflects the growing importance of training athletes from an early age. To achieve long-term success, the development of basic skills must begin with structured and targeted movement training for children.

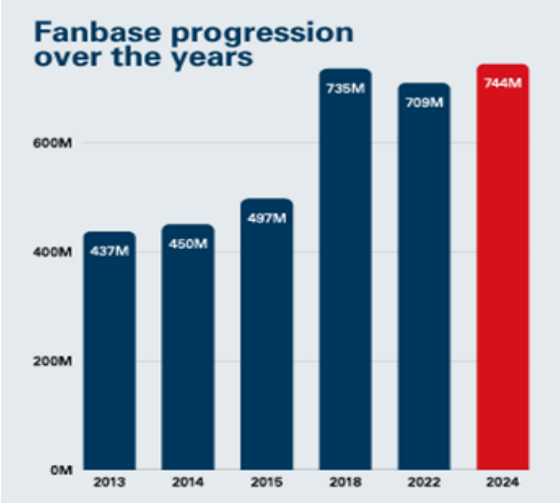

Figure 1. Fanbase progression
Source: BWF Annual Book Report 2024

The development of basic motor skills such as running, jumping, catching, and maintaining balance is an important foundation for advanced sports skills (Griffiths & Billard, 2016). This ability develops optimally between the ages of 6 - 12 and is influenced by practice and experi- ence (Straus & Donnelly, 2017). This ability develops optimally between the ages of 6 - 12, and a lack of learning during this period can make it difficult for children to master more complex motor skills later in life. Structured physical activity interventions have been shown to be ef- fective in improving locomotor, manipulative, and stability skills through practice and experi- ence (Moon et al., 2024).

The BWF Coach Education Coaches Manual Level 1 emphasizes that 2 - 3 years before the period of rapid growth (10 - 16 years) is the golden age for developing athletic skills, when physical stability and nervous system maturity begin to develop (Woodward & Williams, 2017). This is in line with the Long-Term Athlete Development (LTAD) model, in which fundamentals (6 – 9 years) and Learn to Train (9 – 12 years) are critical stages in the formation of young athletes. According to Gallahue & Ozmun, 6 year olds generally have mastered most basic motor skills and are beginning to transition to specific skills (Balyi et al., 2015).

Therefore, the motor skills of young athletes need to be assessed systematically as a basis for targeted and data-driven training program planning, in order to support the process of developing performance from an early age. Objective and standardized assessments, such as those developed in footwork test instruments for junior badminton players (Williyanto et al., 2023), It is important to ensure that essential basic skills, including coordination, speed, and agility, can be measured validly and reliably as a basis for decision-making in coaching.

In the context of badminton, motor skills such as speed, agility, hand-eye coordination, and balance are important components that support an athlete's performance (Jaworski et al., 2023). Therefore, various general motor tests such as short sprints, shuttle runs, vertical jumps, and the Stork Stand Test are used as instruments to measure these abilities. The relevance of these basic motor elements is very important in identifying potential and designing effective training programs for young badminton athletes.

Previous studies have shown that badminton based programs can improve the motor skills of elementary school children (Duncan et al., 2020), and badminton-based physical learning modifications are also effective in improving motor skills (Ishak et al., 2025). These components are not only general indicators of physical development but also have a direct impact on badminton-specific performance. The proof, footwork quality and shot execution are strongly influenced by agility and coordination (Williyanto et al., 2023), while anticipation and rally endurance rely heavily on speed, reaction time, and aerobic capacity (Gao & Tasnaina, 2024). Thus, enhancing basic motor skills directly supports technical proficiency and competitive performance in badminton. However, most clubs still use subjective observation without standardized measurement tools to assess basic motor skills (Wiyanto, 2020). This is an important gap that has not been widely explored by researchers, especially those working at legendary clubs such as PB SGS PLN Bandung City.

The SGS PLN Bandung City Club, established in 1987 and sponsored by PLN since 2024, is one of the most renowned badminton training centers in Indonesia. The club produced the legendary Taufik Hidayat, the 2004 Olympic gold medalist, who began his career there before establishing his own academy (Tirtana, 2020). Now, SGS PLN is back on top thanks to Anthony Ginting, who was inspired by Taufik Hidayat and successfully reached the semifinals of the 2020 Tokyo Olympics as the first men's singles player since Taufik's era (Efandi, 2021).

Knowing the basic motor profile at PB SGS PLN Bandung can provide a real picture of the condition of young athletes at this legendary club, which has produced national athletes. Although the training provided was not directly examined in this study, the profile can serve as a basis for reflection for other clubs in designing training programs. Skills such as running, jumping, and maintaining balance have been proven to support important physical aspects such as speed and agility in badminton (Karyono et al., 2023). By understanding the variations and patterns of young athletes' development in this club, coaches from other clubs can use this data as a reference for developing talented young athletes in a more focused manner.

Moreover, since agility, coordination, and reaction time directly influence footwork and shot execution, this motor profile also provides practical insights into the readiness of athletes to acquire and refine badminton-specific skills.

Figure 3. Basic Motor Components
Source: Infographic by the author (2025)

This research is novel because there is no structured data available on the basic motor profiles of athletes aged 6 – 12 years at PB SGS PLN Kota Bandung, a legendary club that has produced national athletes. Previous studies such as (Wiyanto, 2020) only developed physical condition tests for badminton players aged 10 – 12 years in general, without focusing on club profiles or a wider age range. Similarly, research (Karyono & Paluris, 2022) which discusses the influence of basic movement training on children's motor skills, but does not provide a comprehensive descriptive overview in a real training environment such as PB SGS PLN. Therefore, this study aims to describe the basic motor skill profile of young athletes as a basis for developing training programs appropriate to their stage of development. Theoretically, these findings enrich sports literature, while practically, they can be used by clubs to evaluate training, provide guidance for coaches, and serve as a reference for other badminton academies in systematically developing young athletes.

METHOD

This study used a quantitative descriptive method with a cross-sectional approach. The population in this study were badminton athletes aged 6 – 12 years who were members of PB SGS PLN Kota Bandung. Sampling was conducted using purposive sampling techniques with a sample size of 35 athletes. The inclusion criteria were: (1) active athletes aged 6–12 years registered at PB SGS PLN Bandung, (2) having attended regular training sessions for at least the last six months, and (3) being in good health at the time of data collection. The exclusion criteria were: (1) athletes with current injuries or medical conditions that limited physical

performance, (2) athletes who were absent during the test session, and (3) athletes outside the specified age range.

The instruments used in this study were a series of basic motor skill tests covering:

Table 1. Instrument Test

Test type	Measurement	Source
Speed	10m Sprint	(Mishra et al., 2024)
Agility	Zig-zag running test	(Musawwir et al., 2023)
Balance	Stork stand test	(Jaworski et al., 2023)
Hand-eye coordination	Ball throw and catch test	(Duncan et al., 2020)
Reaction Time	Ruler drop test	(Ishak et al., 2025)
Endurance	Multistage fitness test (beep test)	(Kolimechkov, 2025)

The entire series of tests was conducted in a single data collection session at the PB SGS PLN Bandung City badminton court. The data obtained was analyzed using descriptive statistics (mean, minimum, and maximum values) with the assistance of IBM SPSS Statistics 25 software.

RESULT AND DISCUSSION

Result

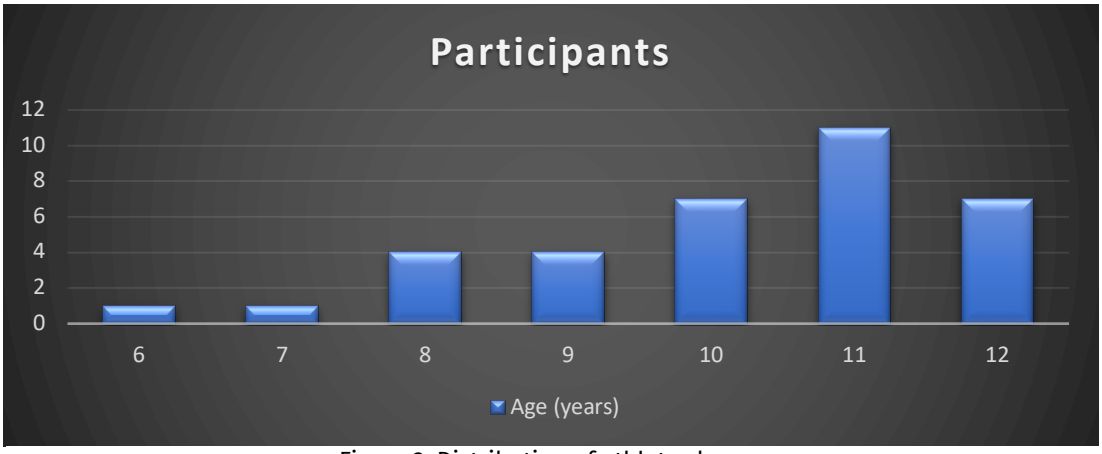

Figure 3. Distribution of athletes by age

This study involved 35 badminton athletes aged 6 – 12 years from the PB SGS PLN Bandung club, covering both the performance and regular categories, thus reflecting the actual training conditions at the club. The participants consisted of: 1 athlete aged 6 and 7 years, 4 athletes aged 8 and 9 years, 7 athletes aged 10 years, 11 athletes aged 11 years, and 7 athletes aged 12 years. The measurement results showed variations in basic motor skills among age groups, illustrating different developmental patterns at each stage of growth. The six basic motor skills evaluated were speed, agility, balance, coordination, reaction time, and endurance, measured using standardized instruments to ensure the validity and reliability of the data. To facilitate understanding, the results are presented in graphical form, showing the average, highest, and lowest values for each instrument according to age group.

1. Speed

Based on data obtained from the research results, the average speed of athletes was above the initial expectations estimated for the early age group. These results reflect the potential for optimal physical development if guided through an appropriate training program. These findings are visually illustrated in the diagram below:

Figure 4. Speed Measurement Results

Figure 4 illustrates the speed performance across age groups. The average sprint time decreased from 3.19 s at ages 6 to 2.28 s at age 12, indicating that older athletes achieved faster running times. This trend reflects natural improvements in speed as motor development progresse.

2. Agility

Based on the research data, the children's agility performance showed impressive results and even exceeded initial expectations in several age groups. These results indicate that the ability to move quickly and change direction effectively begins to develop significantly from an early age. These interesting findings are visualized in the following diagram:

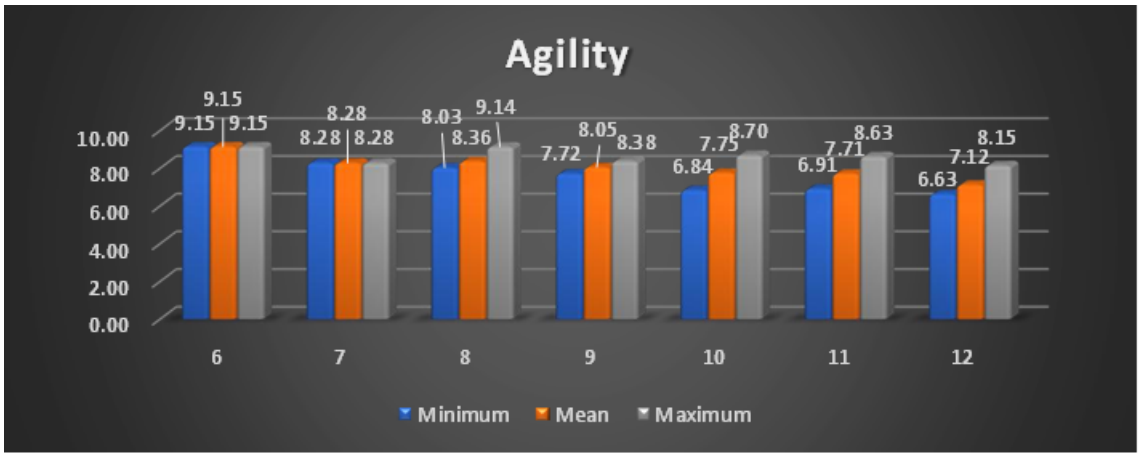

Figure 5. Agility Measurement Results

Figure 5 shows the agility results. Test times declined from 9.15 s at ages 6 to s at age 12, which indicates better agility performance in older athletes. This finding demonstrates that agility develops steadily with age and training exposure.

3. Balance

Balance test results show an improvement in the ability to maintain body stability with age. Children aged 8 to 11 years begin to show better body control. This indicates that balance reflects neuromuscular maturity and can be improved through structured exercise. The results are visualized in the following diagram:

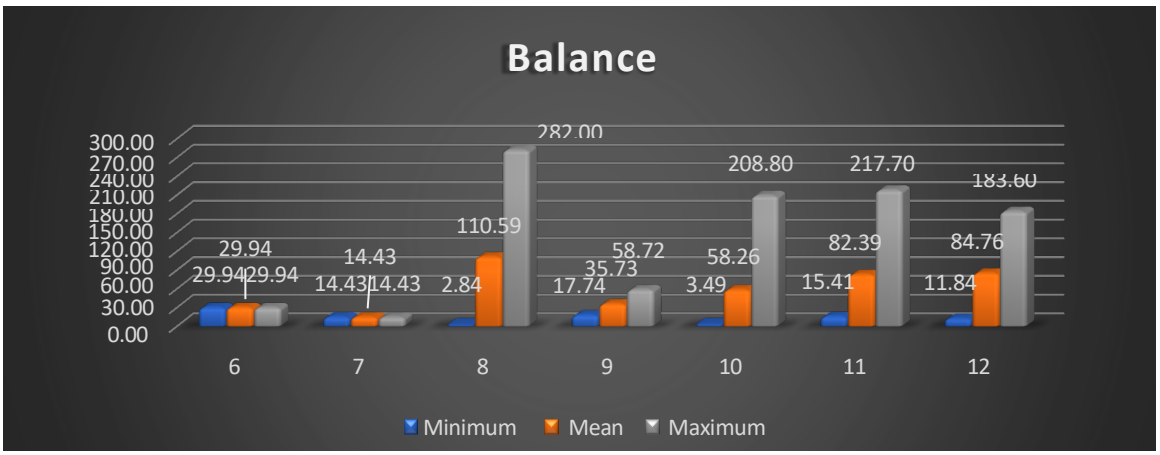

Figure 6. Balance Measurement Results

Figure 6 presents the balance results. The maximum score reached 282 s at age 8, while the average balance duration increased with age, suggesting improvements in neuromuscular control and postural stability as children grow.

4. Coordination

Coordination is an important motor skill that describes the integration between vision, hand movements, and response speed. The measurement results show that children aged 10 – 12 years have better coordination than younger children. These findings indicate that fine motor skills and concentration improve with age. This is clearly shown in the following diagram:

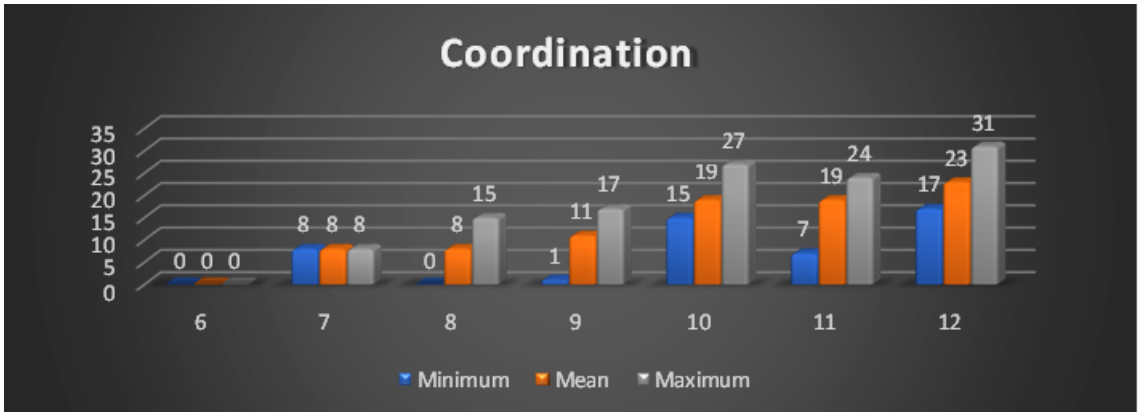

Figure 7. Coordination Measurement Results

Figure 7 displays coordination performance. Athletes aged 7 averaged 8 catches, while those aged 10–12 reached 27–31 catches, reflecting significant enhancement in hand–eye coordination with age.

5. Reaction Time

Reaction time reflects a child's reflex speed and motor readiness in responding to stimuli. The results of the study show a significant increase from the age of 8, when reflexes begin to develop rapidly. These findings indicate increased nervous system maturity with age. The results are visualized in the following graph:

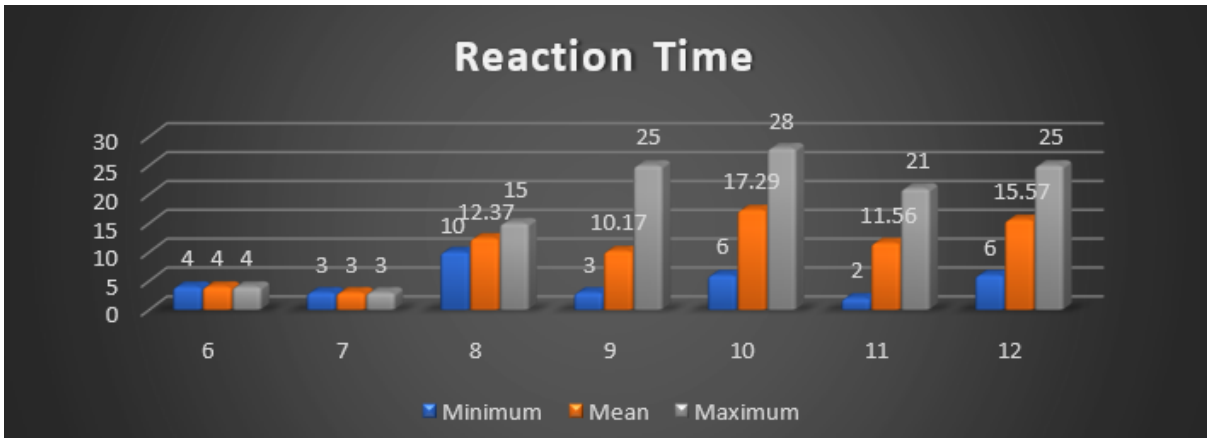

Figure 8. Reaction Speed Measurement Results

Figure 8 illustrates reaction time development. The average catch distance improved from 3–4 cm at ages 6–7 to 15–25 cm at ages 10–12, indicating faster reflexes and better motor readiness in older children.

6. Endurance

Endurance is an important aspect of physical fitness that reflects the body's ability to maintain physical activity for a certain period of time. The beep test results show an increase in aerobic capacity with age. Older children are able to keep up with a faster running pace, reflecting improved cardiovascular and respiratory efficiency. This pattern of development is visualized in the following graph:

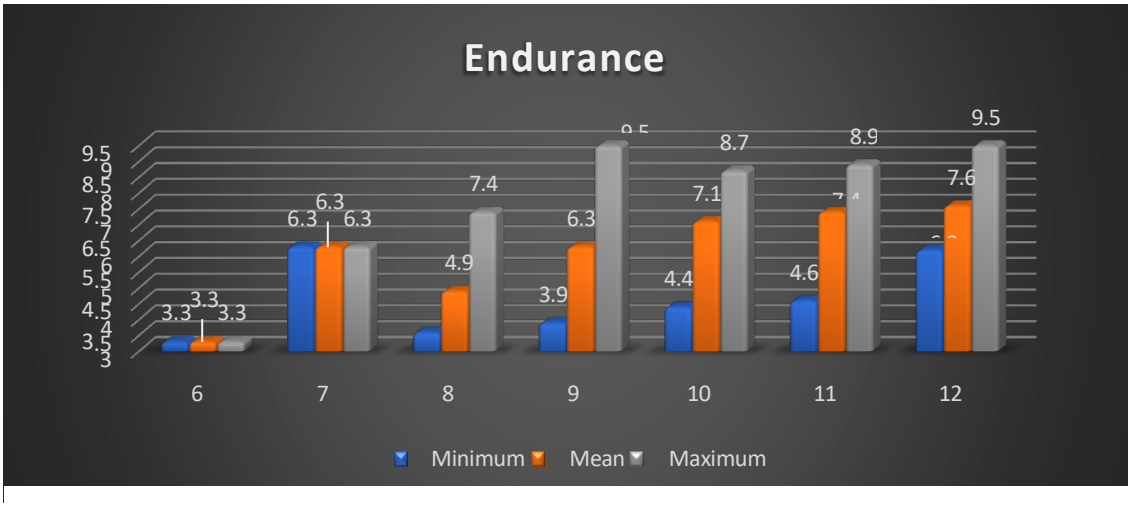

Figure 9. Endurance Measurement Results

Figure 9 shows the endurance results. Younger athletes (ages 6–7) completed levels 3–6, whereas athletes aged 12 reached an average of 7–9 levels. This demonstrates progressive improvement in aerobic capacity with age.

DISCUSSION

This study successfully mapped the basic motor skills profile of badminton athletes aged 6 – 12 years at PB SGS PLN Bandung City. Overall, all six motor components showed improvement with increasing age, reflecting positive physical and neuromuscular development. In terms of speed, there was a decrease in the time taken to complete a 10-meter sprint with age, consistent with the findings of (Rahmadi et al., 2023) who demonstrated that game based training effectively improves the speed of children aged 7 – 9 years. Agility also improved, as reflected in the steady decrease in zig-zag run times, (Gao & Tasnaina, 2024) support this through evidence that the PSAQ program is capable of developing footwork and directional changes from an early age. On balance, the results of the Stork Stand Test showed longer durations, supported by (Muehlbauer et al., 2022) which showed that 7 weeks of training can improve static postural control. Hand-eye coordination improves sharply between the ages of 10 and 12, in line with (Duncan et al., 2020), who state that exercises such as throwing and catching and racket control can hone visual and motor integration. Reaction time increased significantly from the age of 8, in line with (Wu et al., 2025) which demonstrated the effectiveness of visual audio stimulus based training on motor reflexes. Endurance also improves with age, as shown by increased beep test levels, according to research (Nybo, 2018)which states that aerobic capacity develops through gradual rhythmic training in young athletes.

In line with the second objective, the results of this study present objective data on the motor development of athletes aged 6 – 12 years as a b ;'sis for developing training programs

appropriate for each age group. For example, children aged 6 – 8 years are recommended to focus on coordination and balance through games, while those aged 10 – 12 years are ready

for structured training inspeed, footwork, and endurance. This finding is reinforced by (Kurniawan et al., 2024) which proves that hurdle drill and shadow badminton exercises are effective when adjusted to age. Similarly, (Rathod et al., 2024) emphasizes the importance of physical tests such as agility and balance tests to he lp coaches design appropriate training programs while preventing injuries.

Beyond developmental stages, the mastery of basic motor skills plays a decisive role in badminton performance and achievement. Agility, balance, and coordination are directly related to footwork quality and stroke execution, while speed and reaction time support anticipation and shot accuracy. Endurance, in turn, determines the ability to sustain performance during long rallies and tournaments. Previous studies confirm that athletes with stronger motor foundations are more likely to master advanced techniques and achieve higher competitive success (Duncan et al., 2020; Williyanto et al., 2023). Therefore, strengthening basic motor skills in childhood not only supports growth but also provides the physical and neuromuscular base necessary for long-term badminton excellence

CONCLUSION

This study mapped the profile of six basic motor components—speed, agility, balance, coordination, reaction time, and endurance—among athletes aged 6–12 years at the legendary PB SGS PLN Bandung. The findings confirm that motor abilities improve with age and emphasize the need for age-appropriate training programs for young athletes. However, the study was limited by its small sample size, descriptive design, and focus on a single club, which may restrict generalization. Future research should involve larger and more diverse samples, compare different badminton clubs, and explore the direct relationship between motor skills and badminton performance through intervention-based studies.

REFERENCES

Balyi, I., Derek, E., Gardiner, A., Gmitroski, W., Goulet, M., Kaye, D., Pirnie, B., St. Hilaire, D., & Tyler, K. (2015). Athletics Canada - Long Term Athlete Development. *Canadian Heritage*, 1–22.

Borrie, S., Sukumar, D., Kumar, P., & Pierre, D. (2025). BWF Annual Report 2024. In *AIMS Materials Science* (Vol. 12, Issue 1). https://doi.org/10.3934/matersci.2025004

Duncan, M. J., Noon, M., Lawson, C., Hurst, J., & Eyre, E. L. J. (2020). The Effectiveness of a Primary School Based Badminton Intervention on Children's Fundamental Movement Skills. *Sportsq*, *8*(2). https://doi.org/10.3390/sports8020011

Efandi, R. (2021). *Berlatih di Klub yang Sama, Mampukah Anthony Ginting Ikuti Jejak Taufik Hidayat*. SindoNews. https://sports.sindonews.com/read/498242/51/berlatih-di-klub-yang-sama-mampukah-anthony-ginting-ikuti-jejak-taufik-hidayat-1627751312?utm_source=chatgpt.com

Gao, J., & Tasnaina, N. (2024). Development of A Badminton Teaching Program by Adding Power, Speed, Agility, and Quickness (PSAQ) Exercise to Improve Selected Badminton Skills and Physical Fitness in Primary School Students. *International Journal of Sociologies and Anthropologies Science Reviews*, 4(4), 253–262. https://doi.org/10.60027/ijsasr.2024.4394

Griffiths, G., & Billard, R. (2016). *The Fundamental Movement Skills of a Year 9 Group and a Gifted and Talented Cohort. December*. https://doi.org/10.4236/ape.2013.34035

Ishak, M., Sahabuddin, & Hasanuddin, M. I. (2025). *The Effectiveness of Badminton-Based Physical*

Education Learning Modification on Improving Students ' Motor Skills. *7*(2), 194–206.

Jaworski, J., Lech, G., Witkowski, K., Kubacki, R., & Piepiora, P. (2023). Evaluation of measurement reliability for selected indices of postural stability based on data from the GYKO Inertial Sensor System. *Biology of Sport*, *41*(2), 155–161. https://doi.org/10.5114/biolsport.2024.132986

Karyono, T. H., & Paluris, D. S. (2022). *Pengaruh Latihan Basic Movement Berpindah Tempat Terhadap Kelincahan Atlet Bulu Tangkis The Effect of Basic Movement Training on Changing Places on Badminton Athletes ' Agility*. *18*(1), 17–21.

Karyono, T. H., Paluris, D. S., Sridadi, Sunardianta, R., Irianto, S., & Kurniawan, F. (2023). *Pengaruh Latihan Basic Movement di Tempat Terhadap Kondisi Fisik Atlet Bulu Tangkis*. *3*(1).

Kolimechkov, S. (2025). *Assessing Children's Aerobic Fitness by using sports software with international norms*. Aerobic Fitness Norms. https://doi.org/https://kensington-gymnastics.uk/aerobic-fitness-norms/?utm_source=chatgpt.com

Kurniawan, I. F., Suherman, A., & Mulyanto, R. (2024). The Effectiveness of Hurdle Drill and Shadow Exercises to Improve Footwork Skills in Badminton. *Kinestetik : Jurnal Ilmiah Pendidikan Jasmani*, *8*(1), 146–153. https://doi.org/10.33369/jk.v8i1.33282

Mishra, A., Sharvani, B., & Abstract. (2024). *The effect of supplementing regular training with short-duration sprint-agility training on sprint-ability performance in university level badminton players*. https://doi.org/10.4103/pjiap.pjiap

Moon, J., Webster, C. A., Stodden, D. F., Brian, A., Mulvey, K. L., Beets, M., Egan, C. A., McIntosh, L. I. F., Merica, C. B., & Russ, L. (2024). Systematic review and meta-analysis of physical activity interventions to increase elementary children's motor competence: a comprehensive school physical activity program perspective. *BMC Public Health*, *24*(1), 1–16. https://doi.org/10.1186/s12889-024-18145-1

Muehlbauer, T., Brueckner, D., & Schedler, S. (2022). Effect of practice on learning a balance task in children, adolescents, and young adults. *Frontiers in Psychology*, *13*(October), 1–5. https://doi.org/10.3389/fpsyg.2022.989645

Musawwir, M., Nur, S., & Riswanto, A. H. (2023). Penerapan latihan shuttle run dalam meningkatkan kelincahan footwork atlit bulutangkis. *Jurnal Porkes*, *6*(2), 813–825. https://doi.org/10.29408/porkes.v6i2.21228

Nybo, C. M. M. B. B. and L. (2018). *Cross Sectional and Longitudinal Examination of Exercise Capacity in Elite Youth Badminton Players*. *22*, 1754–1761.

Rahmadi, T., Moch. Asmawi, & Hidayat Humaid. (2023). Development of Game Based basic Speed Running Movement Training for Children Age 7 - 9 Years. *Kinestetik : Jurnal Ilmiah Pendidikan Jasmani*, *7*(4), 1037–1045. https://doi.org/10.33369/jk.v7i4.30788

Rathod, D. B., Bhagat, D. C., & Bhura, D. P. A. (2024). Effect of footwork exercises on agility and balance among badminton players of Vadodara. *International Journal of Sports, Health and Physical Education*, *6*(2), 29–35. https://doi.org/10.33545/26647559.2024.v6.i2a.142

Saparudin, D. (2025). *BWF Annual Report 2024: A Year of Milestones and Achievements*. Badminton World Tour. https://badmintonworldtour.com/bwf-annual-report-2024-a-year-of-milestones-and-achievements/

Straus, M. A., & Donnelly, D. A. (2017). *Beating The Devil Out of Them*. Lexington Books. Published. file:///C:/Users/USER/Downloads/9781351314688_previewpdf.pdf

Tirtana, A. (2020). *Ikuti Taufik Hidayat, 4 Pebulutangkis Top Jebolan SGS PLN Bandung*. Indosport. https://www.indosport.com/raket/20200607/ikuti-taufik-hidayat-4-pebulutangkis-top-jebolan-klub-sgs-pln-bandung?utm_source=chatgpt.com

Williyanto, S., Nugraha, R., Nugroho, W. A., Subarjah, H., Paramitha, S. T., Hamidi, A., Badruzaman, Candra, A. R. D., Soegiyanto, Raharjo, H. P., Kusuma, D. W. Y., Wicahyani, S., & Wiyanto, A. (2023). Development of Footwork Skill Test Instrument for Junior Badminton Players. *International Journal of Human Movement and Sports Sciences*, *11*(3), 612–620. https://doi.org/10.13189/saj.2023.110314

Wiyanto, A. (2020). *Norma dan Tes Kondisi Fisik Pebulutangkis Usia 10-12 Tahun*.

Woodward, M., & Williams, L. (2017). *Badminton Coach Education Coaches Manual Level 1 Module 1*. www.badmintonpanam.org

Wu, H., Li, S., Lai, J., Bian, W., Ramirez-Campillo, R., Sáez de Villarreal, E., & Zhao, Q. (2025). Children's Sprint and Jump Performance after Plyometric-Jump Training: A Systematic Review. *Journal of Sports Science and Medicine*, *24*(1), 52–74. https://doi.org/10.52082/jssm.2025.52