The journal « The challenge »: ISSN 9859-1112 EISSN2602-6619
Volume: 18 Issue: 02 / 2026, Pages 371 - 388

The Effect of a Specific Training Program on the Improvement of Motor Skills and Distance Covered in Breaststroke Swimming among Under-15 Swimmers

(أثر برنامج تدريبي محدد على تحسين المهارات الحركية والمسافة المقطوعة في سباحة الصدر لدى السباحين أقل من 15 سنة)

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Received: 01/01/2026 **Accepted: 25/04/2026** **Published: 06 /06/2026**

Abstract:
This study aimed to evaluate the effect of a specific training program on the improvement of motor skills and the distance covered in breaststroke swimming among under-15 swimmers from the province of Sétif. The sample consisted of 20 swimmers assigned to a single experimental group that followed the proposed training program for a period of six weeks. A standardized observational checklist was used to assess motor and technical skills, in addition to measuring the distance covered during a 50-meter swim trial. Data were analyzed using SPSS version 27. The results revealed a significant improvement in motor and technical performance, confirming the effectiveness of the specific training program in enhancing motor skills and increasing the distance covered among swimmers in the under-15 age category.

Keywords: Specific training program; motor skills; distance covered; breaststroke swimming; under-15 swimmers.

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Introduction:

Swimming is considered a sport that requires a high level of coordination between motor, technical, and physical capacities to achieve effective performance, particularly in technically demanding strokes such as breaststroke, which is classified as one of the most complex swimming styles from a technical perspective (Naruebes Kwanphet, Kongkiat Choeychom, 2024, p. 69-78). This stroke requires a dynamic balance between the applied propulsive forces and the coordinated movements of the arms and legs, in addition to refined motor control to achieve optimal distance with high efficiency. Previous studies have shown that neuromotor and skill-related abilities play a crucial role in enhancing the performance of young swimmers and may serve as strong indicators of achievement level in breaststroke swimming (Zehra Gözel, Hasan Aka, 2023, p. 371-376).

In under-15 age groups, this developmental stage is considered highly sensitive for the acquisition and refinement of fundamental motor skills and sport-specific techniques, as the nervous system is characterized by rapid growth and heightened responsiveness to systematic training (Zehra Gözel, Hasan Aka, 2023, p. 371-376). This notion is supported by findings from prior research indicating that structured and specialized training programs can significantly enhance motor and technical capacities among swimmers in this age category, leading to improvements in overall performance in swimming-related physical assessments (Naruebes Kwanphet, Kongkiat Choeychom, 2024, p. 69-78).

Despite the existence of studies addressing motor control training and performance levels across various swimming strokes, limited attention has been given to the systematic development of motor skills and the enhancement of distance covered in breaststroke swimming among children under 15 years of age. Consequently, the present study seeks to address this gap by examining the effects of a specific training program and analyzing its impact using standardized tools for assessing motor skills and distance covered.

1. General Problem:

To what extent does a specific training program contribute to the improvement of motor skills and the increase in distance covered in breaststroke swimming among under-15 swimmers?

1.1. Specific Questions :

- Does the specific training program lead to an improvement in motor skills in breaststroke swimming among under-15 swimmers?
- Does the specific training program contribute to an increase in the distance covered in breaststroke swimming among under-15 swimmers?

2. General Hypothesis:

The specific training program contributes to the improvement of motor skills and the increase in distance covered in breaststroke swimming among under-15 swimmers.

2.1. Specific Hypotheses:

- The specific training program leads to a significant improvement in motor skills in breaststroke swimming among under-15 swimmers.
- The specific training program contributes to a significant increase in the distance covered in breaststroke swimming among under-15 swimmers.

3. Objectives of the Study:

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- Evaluate the effect of a specific training program on the development of motor skills in breaststroke swimming among under-15 swimmers.
- Analyze the effectiveness of the training program in increasing the distance covered during a 50-meter breaststroke swim in the same age group.
- Explore the relationship between improvements in motor skills and practical performance (distance covered) following the implementation of the training program.

4. Importance of the Study:

This study holds both scientific and practical significance by highlighting the impact of a specific training program on the development of motor skills and the enhancement of distance covered in breaststroke swimming among under-15 swimmers, a critical stage for the development of motor and technical capacities.

The study employs precise assessment tools, including a standardized observational checklist and measurement of distance covered, enabling coaches to design more effective training programs to enhance the physical and technical performance of young swimmers. Furthermore, it addresses a knowledge gap in the scientific literature regarding motor performance development in breaststroke swimming within this age category, and provides a foundation for future research on specialized training programs for children and adolescents.

5. Explanation of Terms:

5.1 Specific Training Program:

Definition: A specific training program is a set of pre-planned and systematically organized exercises aimed at improving particular skills or capacities of an athlete over a defined period, with clear technical and temporal objectives to achieve measurable performance enhancement (Bompa Tudor O, Haff G Gregory,, 2009, p. 12). According to Nabil Ghtas et al., it is defined as a set of integrated and interacting components designed for a group of individuals to achieve specific objectives within a determined timeframe (Fouad Fayoult and others, 2001, p. 257).

Operationally: A six-week training plan comprising technical, fitness, and coordination exercises designed to enhance motor performance in breaststroke swimming, implemented according to a structured weekly schedule.

5.2 Motor Skills:

Definition: Motor skill is defined as a learned motor task that involves the ability to perform an action with accuracy, ease, control, and economy of effort (Osama Kamel Rateb, 1999, p. 224). Fundamental motor skills constitute the innate building blocks of child movement, serving as a means for expression, exploration, and self-development, facilitated through structured situations that challenge and stimulate the child's capabilities (Afaf Osman Mustafa, 2011, p. 131).

Operationally: The swimmer's proficiency in executing technically correct breaststroke movements, assessed using a standardized observational checklist focusing on coordination between arms and legs, breathing control, and movement harmony.

5.3 Distance Covered:

Definition: The length of the path traversed by an athlete during a specific movement or sports test, used as an objective indicator of practical performance level(McGinnis Peter M, 2013, 59).

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Operationally: The distance swum by the athlete in a 50-meter breaststroke test, recorded in meters at the end of the trial.

5.4 Breaststroke Swimming:

Definition: Breaststroke is considered the most comfortable swimming style for moving through the aquatic environment. In this technique, the movements of the legs and feet are performed symmetrically and at the same level. When pushing the water with the legs, the feet must be rotated outward to push it inward (Zaki Ali Mohamed, 2002, p. 78).

Operationally: The swimmer's movement on the chest while performing coordinated arm and leg techniques, with performance measured by the distance covered during a 50-meter test.

5.5 Swimmers Under 15 Years:

Definition: The age group comprising participants who have not yet reached their fifteenth birthday at the beginning of the study, representing a critical stage for motor and technical development (Gözel Zeynep, Aka, Hasan, 2023, p. 371-376).

Operationally: Participants who are younger than 15 years at pre-test measurement, with age determined precisely according to each swimmer's recorded date of birth.

6. Previous Studies:

6.1 Karadenizli, İlbak, Jorgić & Bartik (2025):

Title: Physical performance predictors in youth breaststroke swimming: motor and biomotor diagnostic differences.

Objective: To identify motor and biomotor variables predicting breaststroke performance in young swimmers.

Methodology: A comparative cross-sectional design was applied to 58 youth swimmers, classified into high- and low-performance groups based on 50-m breaststroke time.

Results: Agility, vertical jump height, balance, and arm span were significantly higher in the high-performance group, indicating their importance as key determinants of breaststroke performance.

6.2 Chen & Siriphan (2025):

Title: Development of Specific Training Programs to Improve Breaststroke Performance for Sport University Students.

Objective: To develop and test a specific training program to improve breaststroke performance in sports university students and examine its effect on performance.

Methodology: A two-group experimental design was used with randomly selected students from the School of Physical Education, Minnan Normal University. Participants were assessed on breaststroke movements and 50-m breaststroke performance before training, after 4 weeks, and after 8 weeks of specific training. Data were analyzed using mean, standard deviation, T-test, ANOVA, and Bonferroni post hoc analysis.

Results: Significant differences were found between the experimental and control groups in breaststroke movements (leg and hand movements, breathing timing, body coordination) and 50-m results. The experimental group showed continuous improvement over 8 weeks.

6.3 Lee, Chao, Hsu, Chang, Chen & Tsai (2025):

Title: Effects of different warm-up methods on 50-meter breaststroke swimming performance.

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Objective: To examine the effects of four different warm-up methods on 50-m breaststroke performance in breaststroke and individual medley swimmers.

Methodology: 18 swimmers (9 breaststroke, 9 individual medley) completed four warm-up protocols—conventional, tubing-assisted (TA), paddle (PD), and squat (SQ)—on separate days. Performance was assessed using IMU sensors for stroke length, stroke frequency, and limb acceleration.

Results: TA warm-ups improved performance for breaststroke specialists, resulting in shorter stroke lengths and higher stroke frequency. SQ warm-ups tended to benefit individual medley swimmers. Acceleration data alone did not fully explain performance differences.

6.4 Todd Price, Giuseppe Cimadoro and Hayley S Legg (2024):

Title: Physical performance determinants in competitive youth swimmers: a systematic review.

Objective: To identify key physiological and anthropometric determinants of youth swimming performance, including strength, power, anaerobic and aerobic capacities, and body composition.

Methodology: A systematic review of electronic databases (PubMed, Web of Science) identified 843 studies, with 43 meeting inclusion criteria (competitive/trained youth swimmers, time-trial/event data, English, peer-reviewed). Risk of bias was assessed using the Joanna Briggs Institute (JBI) checklist.

Results: Youth swimming performance was primarily influenced by muscle strength, muscle power, lean body mass, and anaerobic/aerobic metabolism. Body fat percentage showed no consistent effect. Cross-sectional studies scored 4–8 and RCTs 8–9 on JBI checklists.

6.5 Dražen Rastovski, Dajana Zoretic and Marko Đurovic (2022):

Title: The Impact of a Swimming Training Season on Anthropometrics, Maturation, and Kinematics in 12-Year-Old and Under Age-Group Swimmers.

Objective: To examine the relationships between anthropometric measures, maturation, and kinematic variables in age-group swimmers, and how these factors influence 25-m breaststroke and butterfly performance over a 47-week training season.

Methodology: Twenty youth swimmers (11 girls, 9 boys; average age ~10–10.5 years) performed all-out 25-m swim tests in breaststroke and butterfly before and after 47 weeks. Network analysis was applied to assess betweenness, closeness, and strength centrality measures, while t-tests and Hedges' g effect sizes quantified changes.

Results: Large improvements in swimming times were observed for both breaststroke (32.0 ± 7.5 to 24.5 ± 3.8 s; g = 1.26) and butterfly (30.3 ± 7.0 to 21.8 ± 3.6 s; g = 1.52). Small-to-moderate changes were noted in anthropometrics, with moderate changes in maturity offset (−2.0 ± 0.9 to −1.3 ± 1.0; g = 0.73). Arm span (breaststroke) and stroke length (butterfly) were key determinants highlighted by network analysis.

6.6 Rastovski, Zoretic & Đurović (2025):

Title: Trends in Swimming Competence Among Youth: A Repeated Cross-Sectional Study (2020–2024).

Objective: Examine swimming skills and self-assessment accuracy in 10-year-old children over five years.

Methodology: Repeated cross-sectional study with 4340 third-graders completing annual self-assessments and standardized swimming tests (2020–2024).

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Results: Non-swimmers remained high (64–76%), with consistent overestimation of abilities. Highlights the need for better school programs and community engagement.

6.7 Naruebes Kwanphet and Kongkiat Choeychom (2024):

Title: The Effects of Complex Training on Breaststroke Performance of Young Swimming Athletes.

Objective: Investigate the effects of complex training on breaststroke performance in young swimmers.

Methodology: 30 swimmers (12–14 years) were divided into experimental and control groups. Pre-test and post-tests at 4 and 8 weeks measured 25-meter breaststroke speed. Data analyzed using mean, standard deviation, t-test, and Bonferroni test.

Results: No difference before training; significant improvement in breaststroke performance observed in the experimental group after 4 and 8 weeks. Complex training enhances strength, speed, and endurance.

6.8 Zi-An Lu et al (2025):

Title: Effect of gender and training years on the upper extremity dynamic balance function in adolescent swimmers.

Objective: Examine factors influencing upper extremity dynamic balance in adolescent swimmers.

Methodology: 62 adolescent swimmers were grouped by training experience, gender, and hand dominance. Balance and limb function were assessed using UESEBT and related tests.

Results: Experienced swimmers, males, and non-dominant hand groups showed better dynamic balance. Performance was weakly negatively correlated with arm skinfold thickness.

- Insights from Previous Studies:

Previous studies provided a comprehensive scientific and methodological framework for investigating breaststroke performance in young swimmers. They highlighted the critical role of specific motor skills, including balance, agility, motor coordination, and explosive strength, in enhancing performance. The effectiveness of training programs designed according to the technical characteristics of breaststroke was demonstrated, with short-distance performance (25–50 m) validated as an appropriate indicator of technical and physical development. Additionally, previous research emphasized the use of standardized observation tools for evaluating motor skills and the importance of early training interventions to promote neuromuscular coordination in swimmers under 15 years old. Methodological models and experimental designs were also outlined, confirming the efficacy of modern statistical approaches, such as SPSS, for data analysis. Collectively, these studies established a solid foundation for examining the impact of a specific training program on motor skills and distance covered in breaststroke among young swimmers within a precise experimental context.

7. Research Methodology Procedures:

7.1 Descriptive Methodology:

The study employed an experimental design due to its suitability for examining the effects of a specific training program on physical and skill-related variables associated with breaststroke in young swimmers. This approach allowed for precise control of independent variables and the direct observation of their impact on dependent variables. A pre-test and post-test

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experimental design was implemented to monitor changes resulting from the training intervention scientifically and objectively, while maintaining consistent measurement conditions and tools to ensure validity and reliability of the results.

2.7 Research Community:

The study community consisted of breaststroke swimmers under the age of 15 who are enrolled in swimming clubs or specialized sports schools and participate in regular training programs throughout the competitive season. This population is characterized by specific developmental and motor attributes, as this age range represents a sensitive period for the acquisition of fundamental motor skills, technical proficiency, and the enhancement of physical capacities related to swimming performance.

This population was selected because it represents the target group whose performance the study aims to improve through the implementation of a structured and age-appropriate specific training program.

3.7 Sample:

A purposive sample was drawn from the original study population, including swimmers under 15 years of age with comparable experience in breaststroke training. Participants were matched in terms of technical skill level, health status, and regular attendance in training sessions, without having sustained injuries during the study period.

Selection criteria ensured that the sample was homogeneous with respect to key characteristics (chronological age, training level, and training regimen), thereby enhancing the accuracy of the results and minimizing the influence of external factors. The sample followed the same specific training program for a uniform duration, adhering to all its components and stages, which allows attributing observed post-intervention changes directly to the applied training program.

8. Pilot Study:

8.1 Phase One:

This phase involved evaluating the validity of the observational checklist used to assess motor skills in breaststroke swimming by applying it to a limited group of swimmers. The clarity of the checklist indicators, the ease of recording observations, and the practical duration required to conduct the measurements were all verified to ensure accurate and feasible data collection.

8.2 Phase Two:

A shortened unit of the specific training program was implemented on the pilot sample to review the duration of each training session, calibrate exercise intensity, and refine the technical execution of the exercises. This phase facilitated the adjustment of any elements that could hinder the smooth implementation of the program or affect measurement outcomes.

8.3 Phase Three:

This phase included a trial of the 50-meter breaststroke distance test to ensure the feasibility of the test for the target sample. Measurement conditions and repetition procedures were standardized to guarantee the accuracy of results and their suitability for subsequent statistical analysis.

9. Scope of the Study:

9.1 Spatial Scope:

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The study was conducted at the Olympic swimming pool in Sétif, which provides an optimal training environment for executing the required exercises and tests. The facility was fully equipped with all necessary tools and materials to ensure the implementation of the specific training program according to established scientific standards.

9.2 Temporal Scope:

The study spanned from July 12 to August 22, 2025, covering six consecutive weeks of training. During this period, the specific training program was implemented, and pre- and post-intervention measurements of the study variables were conducted, allowing the monitoring of the program's effect on motor performance and distance covered.

9.3 Human Scope:

The human scope consisted of 20 swimmers participating in the training program. Homogeneity in key characteristics such as age and training experience was maintained to control for confounding factors and enhance the reliability of observed changes.

10. Procedures for Implementing the Observational Checklist and the 50-Meter Distance Test:

The observational checklist for motor skills was integrated with the 50-meter breaststroke distance test to ensure a comprehensive assessment of swimmers' performance in terms of motor, technical, and physical capacities, following these procedures:

10.1 Preparation and Orientation:

- Swimmers were informed about the objectives of the test and the observational checklist, and the method for recording performance during swimming was explained.
- Swimmers completed an appropriate warm-up prior to testing to prevent injuries.
-Conditions at the Olympic swimming pool in Sétif were standardized for all swimmers, including water temperature, lane clarity, lighting, and other environmental factors.

10.2 Application Method:

- Each swimmer started from the designated starting point at the pool edge and performed a 50-meter breaststroke swim.
- During the swim, observers used the checklist to assess motor skills for each swimmer, focusing on the following variables:

  - Body position during swimming
  - Arm movement and coordination
  - Leg movement and propulsion
  - Breathing and overall motor coordination

10.3 Scoring and Recording Results :

- Each variable was scored on a 5-point scale according to the standardized checklist levels:

  - Level 1: Very Poor → 1 point
  - Level 2: Poor → 2 points
  - Level 3: Average → 3 points
  - Level 4: Good → 4 points
  - Level 5: Excellent → 5 points

- Simultaneously, the time taken to complete the 50-meter swim was recorded, and any factors potentially affecting performance (e.g., pauses, technique deviations) were noted.

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- Measurements were conducted twice: prior to the training program (pre-test) and after its completion (post-test), to capture any improvements in motor performance and physical capacity.

10.4 General Notes:

- Observers were trained in advance to use the checklist and timing procedures to ensure consistency and standardization of assessment across all swimmers.
- Integrating the distance test with the observational checklist provided a comprehensive view of swimmer performance, combining technical skill evaluation with physical components, thus supporting precise and objective monitoring of the training program's effects.

Table 01: Observational Checklist for Motor Skills in Breaststroke Swimming (5-Point Scale)

Variables	Level 1	Level 2	Level 3	Level 4	Level 5
Body position during swimming	Unbalanced, body not level with the water	Slight balance, noticeable tilt during swimming	Moderate balance, minor tilt	Well-balanced, mostly level	Perfectly balanced, body straight and level throughout
Arm movement and coordination	Uncoordinated, discontinuous and disharmonious	Poor coordination with some interruptions	Moderate coordination, minor disharmony	Largely coordinated, slight variability	Fully coordinated arms, smooth and consistent rhythm
Leg movement and propulsion	Ineffective movement, weak propulsion, no coordination with arms	Weak movement with limited coordination with arms	Acceptable movement, some coordination with arms	Strong and largely coordinated movement with arms	Fully strong and coordinated movement, full propulsion in harmony with arms
Breathing and overall motor coordination	Irregular breathing affecting movement, clear interference with performance	Intermittent breathing with some effect on coordination	Moderately regulated breathing, limited impact on coordination	Largely regular breathing, good coordination	Smooth and regular breathing, excellent coordination throughout the swim

Source: Prepared by the researcher.

11. Scientific Foundations of the Tests:

11.1 Validity:

11.1.1 Content Validity:

The suitability of the observational checklist for assessing motor skills in breaststroke swimming was verified by distributing it to nine experts specialized in swimming and sports training.

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- Experts were asked to review the items and evaluate their comprehensiveness in covering fundamental skills, clarity of indicators, and appropriateness for the target age group (<15 years).
- Certain items were modified based on expert feedback to ensure alignment of the instrument with the study objectives.

11.1.2 Construct Validity (Self-Validity):

- Construct validity for each variable was calculated using the square root of the correlation coefficient between pre- and post-test measurements in the pilot sample (6 swimmers).
- This validity reflects the ability of the checklist to measure actual swimmer performance and confirms the accuracy of the instrument before its application to the experimental sample.

11.2 Reliability:

Reliability refers to the degree to which a test consistently measures the phenomenon under study, producing the same results if repeated under identical conditions (Leila El-Sayed Farhat, 2007, p. 143; Nabil Abdel Hadi, 1999, p. 66).

To ensure measurement reliability, Pearson's correlation coefficient (r) was calculated between pre- and post-test scores for each variable in the pilot sample.

Table 02: Reliability of the Observational Checklist and 50-Meter Distance Test Variables

Variable	Pre-Test (Mean ± SD)	Post-Test (Mean ± SD)	Pearson's r (Reliability)	Self-Validity (√r)
Body position during swimming	2.78 ± 0.62	2.92 ± 0.58	0.91	0.95
Arm movement and coordination	2.65 ± 0.58	2.79 ± 0.55	0.89	0.94
Leg movement and propulsion	2.72 ± 0.60	2.85 ± 0.57	0.90	0.95
Breathing and overall motor coordination	2.80 ± 0.64	2.93 ± 0.60	0.92	0.96
Distance covered (50 meters)	52.3 ± 3.5	51.8 ± 3.2	0.88	0.94

Source: Prepared by the researcher.

The table shows that pre- and post-test measurements are closely aligned for all variables, reflecting the reliability of the measurement instrument in the pilot sample. High Pearson correlation coefficients (0.88–0.92) indicate stable results upon repetition, while self-validity (0.94–0.96) confirms the checklist's ability to accurately measure actual performance. This reliability and stability provide a strong foundation for using the instrument to evaluate the effect of the training program on the experimental sample.

11.3 Objectivity:

A test is considered objective if it yields the same score regardless of the assessor (Fatma Awad Saber, 2003, p. 164). Objectivity in this study was ensured by training observers to use the checklist and score numerical variables (1–5) according to predefined standards, with all tests conducted under identical environmental conditions for each swimmer.

This approach minimizes personal bias and ensures consistent and fair evaluation for all participants.

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12. Data Normality and Sample Equivalence in Study Tests:

Table 03: Equivalence of the Experimental Sample in Motor Skills and Distance Covered Tests

Variable	Mean	SD	Tc	df (n-1)	Sig.	Significance Level
Body position during swimming	2.81	0.62	0.43	19	0.67	Not significant
Arm movement and coordination	2.72	0.57	0.47		0.64	Not significant
Leg movement and propulsion	2.76	0.61	0.50		0.63	Not significant
Breathing and overall motor coordination	2.84	0.63	0.45		0.66	Not significant
Distance covered (50 meters)	51.9	3.4	0.49		0.65	Not significant

Source: Prepared by the researcher.

All Sig values exceed the significance threshold (0.05), indicating no statistically significant differences between pre-test measurements of the variables within the experimental sample. This confirms the equivalence of the sample, ensuring its suitability for conducting the experiment without bias in the results.

13. Presentation and Analysis of Study Results:

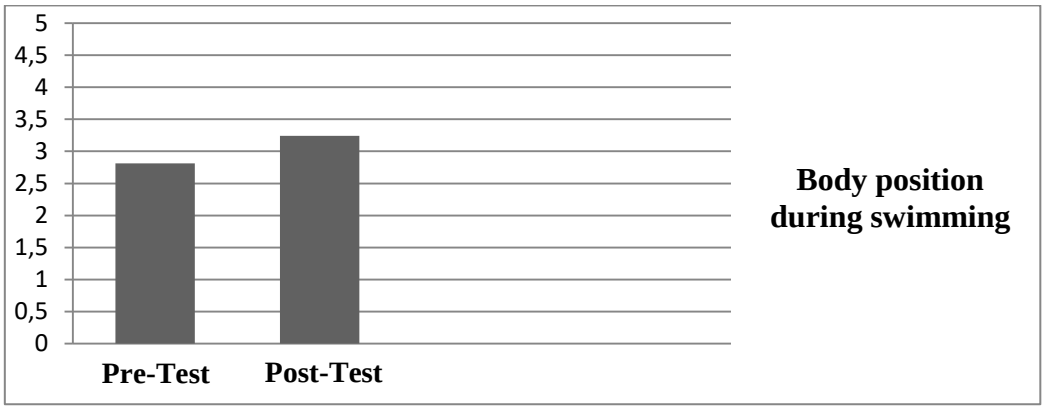
13.1 Results of the Body Position During Swimming Test (Pre- and Post-Test) and Calculated t-Value for the Experimental Group:

Table 04: Comparison of Pre- and Post-Test Results for Body Position During Swimming

Measurement	Mean	SD	Tc	Sig.	α	Significance Level
Pre-test	2.81	0.62	3.72	0.002	0.05	Statistically significant
Post-test	3.24	0.58				

Source: Prepared by the researcher.

Figure. 1. Graphical representation of the mean values for the Pre- and Post-Test Results for Body Position During Swimming



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Source: Prepared by the researcher.

The results indicate a notable improvement in body position during swimming, with the pre-test mean (2.81 ± 0.62) increasing to a post-test mean of 3.24 ± 0.58 following the implementation of the specific training program.
The calculated t-value (3.72) and significance level (Sig = 0.002) demonstrate that the differences are statistically significant at the 0.05 level, reflecting the impact of the training program on enhancing the overall body posture of the swimmers.
This improvement supports the first sub-hypothesis, which posits that the specific training program leads to a significant enhancement of motor skills in breaststroke swimming among swimmers under 15 years of age.

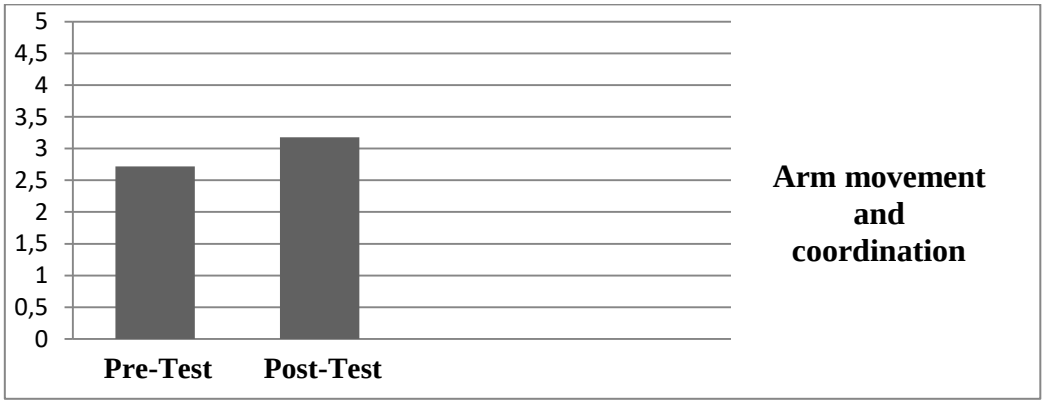
13.2 Results of Arm Movement and Coordination Test (Pre- and Post-Test) and Calculated t-Value for the Experimental Group:

Table 05: Comparison of Pre- and Post-Test Results for Arm Movement and Coordination

Measurement	Mean	SD	Tc	Sig	α	Significance Level
Pre-test	2.72	0.57	3.48	0.003	0.05	Statistically significant
Post-test	3.18	0.54				

Source: Prepared by the researcher.

Figure 2. Graphical representation of the mean values for the Pre- and Post-Test Results for Arm Movement and Coordination



Source: Prepared by the researcher.

The results indicate a notable improvement in arm movement and coordination, with the pre-test mean (2.72 ± 0.57) increasing to a post-test mean of 3.18 ± 0.54 following the implementation of the specific training program.
The calculated t-value (3.48) and significance level (Sig = 0.003) demonstrate that the differences are statistically significant at the 0.05 level, reflecting the impact of the training program in enhancing the motor coordination of the arms during breaststroke swimming.
This improvement supports the study hypothesis regarding the effectiveness of the specific training program in enhancing motor skills among swimmers under 15 years of age.

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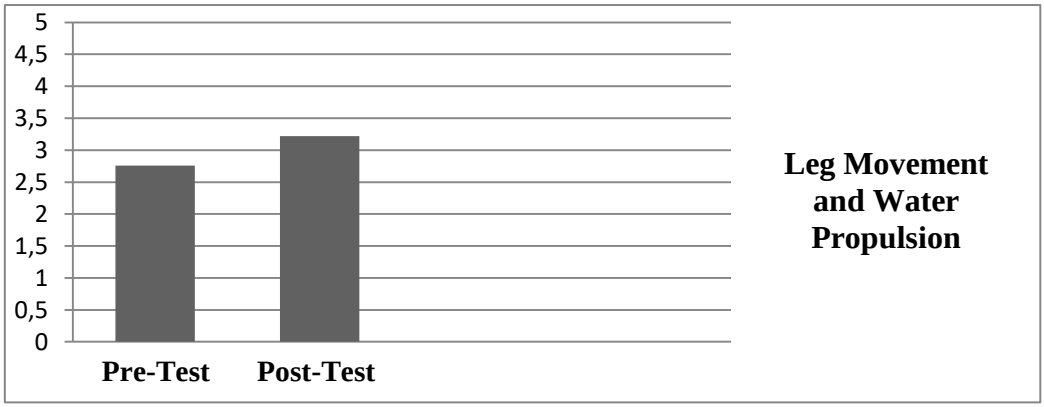
13.3 Results of Leg Movement and Propulsion Test (Pre- and Post-Test) and Calculated t-Value for the Experimental Group:

Table 05: Comparison of Pre- and Post-Test Results for Leg Movement and Propulsion

Measurement	Mean	SD	Tc	Sig	α	Significance Level
Pre-test	2.76	0.61	3.56	0.002	0.05	Statistically significant
Post-test	3.22	0.58				

Source: Prepared by the researcher.

Figure 3. Graphical representation of the mean values for the Pre- and Post-Test Results for Leg Movement and Propulsion



Source: Prepared by the researcher.

The results indicate a clear improvement in leg movement and water propulsion, with the pre-test mean (2.76 ± 0.61) increasing to a post-test mean of 3.22 ± 0.58 after applying the specific training program.

The calculated t-value (3.56) and significance level (Sig = 0.002) confirm that the differences are statistically significant at the 0.05 level, indicating the training program's effect in enhancing leg movement efficiency and overall motor coordination in breaststroke swimming. This finding supports the study hypothesis regarding the program's effectiveness in improving motor skills among swimmers under 15 years of age.

13.4 Results of Breathing and Overall Motor Coordination Test (Pre- and Post-Test) and Calculated t-Value for the Experimental Group:

Table 05: Comparison of Pre- and Post-Test Results for Breathing and Overall Motor Coordination

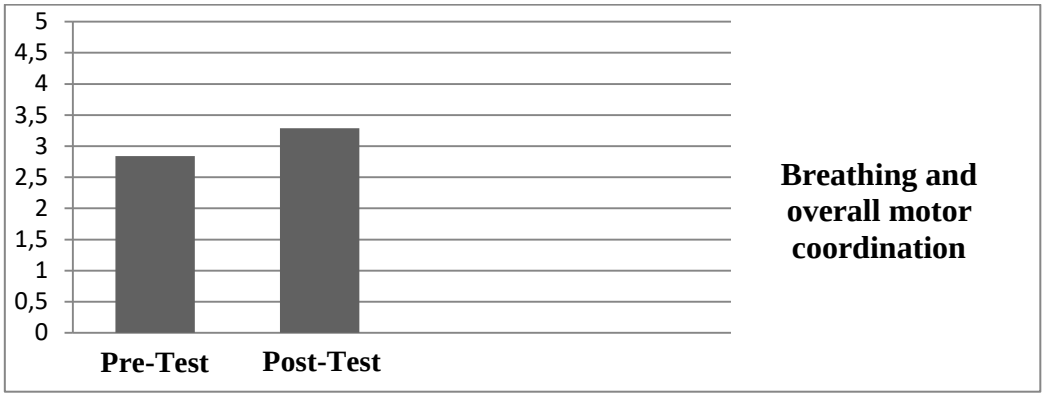
Measurement	Mean	SD	tc	Sig	α	Significance Level
Pre-test	2.84	0.63	3.61	0.002	0.05	Statistically significant
Post-test	3.29	0.59				

Source: Prepared by the researcher.

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Figure 4. Graphical representation of the mean values for the Pre- and Post-Test Results for Breathing and Overall Motor Coordination



Source: Prepared by the researcher.

The results demonstrate a notable improvement in breathing and overall motor coordination, with the pre-test mean (2.84 ± 0.63) increasing to a post-test mean of 3.29 ± 0.59 following the implementation of the specific training program.

The calculated t-value (3.61) and significance level (Sig = 0.002) confirm that the differences are statistically significant at the 0.05 level, reflecting the training program's effect on enhancing overall motor coordination and breathing efficiency during breaststroke swimming. This improvement supports the study hypothesis concerning the effectiveness of the training program in enhancing motor skills among swimmers under 15 years of age.

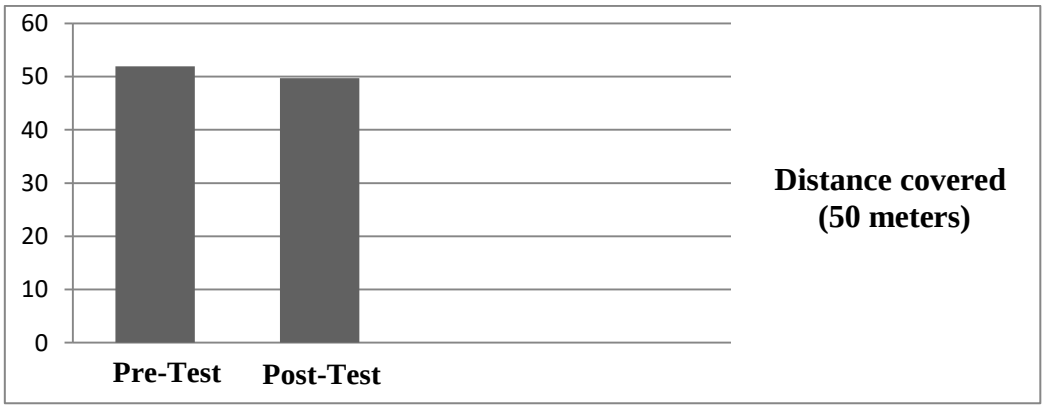
13.5 Results of the Distance covered (50 meters)Test (Pre- and Post-Test) and Calculated t-Value for the Experimental Group:

Table 05: Comparison of Pre- and Post-Test Results for the Distance covered (50 meters)

Measurement	Mean (s)	SD	t	Sig.	α	Significance Level
Pre-test	51.9	3.4	4.12	0.001	0.05	Statistically significant
Post-test	49.7	3.1				

Source: Prepared by the researcher.

Figure 5. Graphical representation of the mean values for the Pre- and Post-Test Results for Distance covered (50 meters)



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Source: Prepared by the researcher.

The results indicate a significant improvement in the 50-meter distance, with the pre-test mean time (51.9 ± 3.4 s) decreasing to a post-test mean time of 49.7 ± 3.1 s after applying the specific training program.
The calculated t-value (4.12) and significance level (Sig = 0.001) demonstrate that the differences are statistically significant at the 0.05 level, reflecting the impact of the training program on enhancing performance efficiency and the distance covered during the race.
This finding supports the second sub-hypothesis, which states that the specific training program contributes to improving the 50-meter distance performance in breaststroke swimming among swimmers under 15 years of age.

14. Discussion of Study Results:

14.1 Discussion of the First Hypothesis: The Impact of the Specific Training Program on Enhancing Motor Skills in Breaststroke Swimming among Swimmers Under 15 Years.

The findings of this study revealed a statistically significant improvement across all motor skill indicators, including body position during swimming, arm movement and coordination, leg movement and water propulsion, as well as breathing and overall motor coordination, following the implementation of the specific training program. The calculated t-values and significance levels (Sig) indicate that the differences between pre- and post-test measurements were statistically significant at the 0.05 level.
These results are consistent with the findings of Karadenizli et al. (2025), who highlighted the importance of balance, agility, and stroke length in enhancing breaststroke performance among young swimmers. Similarly, Chen & Siriphan (2025) reported that a specific training program contributed to improving body coordination, technical movements, and motor control in collegiate swimmers.
Additionally, studies focusing on complex training or effective warm-up protocols, such as Lee et al. (2025) and The Effects of Complex Training (2024), demonstrated notable improvements in movement coordination and performance efficiency, suggesting that structured and targeted exercises lead to tangible enhancements in motor skills, which aligns with the outcomes of the present study.
Moreover, systematic investigations, including Physical Performance Determinants in Competitive Youth Swimmers (2024) and Effect of Gender and Training Years (2025), emphasized that muscular strength, explosive power, and dynamic balance are positively associated with the development of motor skills, further reinforcing the validity and credibility of the results obtained in this study.

14.2 Discussion of the Second Hypothesis: The Effect of the Specific Training Program on Enhancing Distance Covered in Breaststroke Swimming among Swimmers Under 15 Years.

The post-test results demonstrated a statistically significant reduction in the 50-meter swimming time compared to the pre-test, indicating an improved ability to cover the distance more quickly and efficiently.
These findings are in agreement with Chen & Siriphan (2025), who reported improvements in 50-meter times following the implementation of a structured and specific training program. Similarly, Lee et al. (2025) found that organized warm-up protocols contributed to enhanced swimming time and distance covered. Moreover, our results corroborate the findings of Todd

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Price et al. (2024), which emphasized the importance of continuous training and the combination of strength and technical programs in optimizing both time performance and distance covered.

Longitudinal and comparative studies, such as Rastovski et al. (2025), highlighted the significance of early and sustained intervention. This perspective explains the effectiveness of the specific training program in the present study in improving 50-meter times among swimmers under 15 years old, due to enhanced motor organization, refined technical skills, and increased muscular coordination efficiency.

14.3 General Hypothesis: The Specific Training Program Contributes to Improving Motor Skills and Increasing Distance Covered in Breaststroke Swimming among Swimmers Under 15 Years.

Based on the post-test results across all measured variables, statistical significance levels, and a comparison with recent relevant studies, it can be concluded that the specific training program effectively enhances motor skills and improves performance efficiency in breaststroke swimming among swimmers under 15 years. These findings support the study's general hypothesis.

15. Conclusions:

- **Improvement of Motor Skills:** The study results indicated that the specific training program led to a significant improvement in all motor skill indicators among swimmers under 15 years, including body position during swimming, arm movement and coordination, leg movement and water propulsion, as well as breathing and overall motor coordination.
- **Enhanced Performance Efficiency:** The findings demonstrated a significant reduction in the 50-meter swimming time after implementing the program, reflecting an increased distance covered and enhanced performance efficiency in breaststroke swimming.
- **Effectiveness of Structured and Specific Training Programs:** The study confirms that applying a well-structured and targeted training program contributes clearly to improving the technical and motor performance of young swimmers, highlighting the importance of precise planning of training exercises tailored to the age and physical capacities of the athletes.
- **Support for Previous Research:** The results are consistent with numerous recent studies (Karadenizli et al., 2025; Chen & Siriphan, 2025; Lee et al., 2025), which demonstrated that systematic and continuous training, combined with a variety of technical and motor exercises, enhances performance levels and motor skill development.
- **Importance of Early and Continuous Intervention:** The findings emphasize that early training interventions for children and swimmers under 15 years contribute to the development of fundamental motor skills and increased physical and technical efficiency, supporting the necessity of specialized and continuous training programs for young swimmers.

16. Practical Recommendations:

- **Design of Structured and Specific Training Programs:** Coaches should develop training programs that target the enhancement of fundamental motor skills and technical

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abilities in young swimmers, taking into account age, experience level, and individual physical characteristics to ensure training effectiveness.

- **Focus on Movement Coordination and Core Techniques:** It is recommended to incorporate exercises specifically addressing arm movement, leg movement, body position, and breathing to improve motor coordination and overall performance in breaststroke swimming.
- **Utilization of Time Measurements and Standardized Observation:** Applying standardized observation checklists and time-based tests (e.g., 50-meter swimming) is advised to monitor swimmer progress and evaluate the impact of training programs on motor skills and overall performance.
- **Early and Continuous Intervention:** It is essential to implement systematic training programs from an early age (under 15 years) and maintain continuity in structured exercises to enhance physical and technical skills before puberty, ensuring sustainable athletic development.
- **Diversity in Technical and Physical Exercises:** Combining technical drills, muscular strength exercises, and motor coordination activities is recommended to achieve comprehensive improvement in motor abilities and performance in breaststroke swimming.
- **Development of Individualized Monitoring Programs:** It is advisable to create individualized monitoring plans for each swimmer based on performance level, with periodic assessments to identify strengths and weaknesses, and to make continuous adjustments to the training plan to ensure optimal results.

Reference:

1. Bompa, T., & Haff, G., Periodization: Theory and methodology of training (5th ed.), Human Kinetics, 2009.
2. Chen, W., & Siriphan, C., Development of specific training programs to improve breaststroke performance for sport university students, International Journal of Sociologies and Anthropologies Science Reviews, 5(2), 2025, 327–336.
3. Rateb, O. K., Motor Development, Cairo, Dar Al-Fikr Al-Arabi, 1999, p. 224.
4. Farhat, L. E.-S., Measurement and testing in physical education, Al-Kitab Center, 2007.
5. Fouad Fayoult, S. Basyouni, A. S. Suleiman, M. M. Al-Nahas, Research and Studies in the Psychology of Disability, Zahra Al-Sharq Library, 2001.
6. Karadenizli, Z. İ., İlbak, İ., Jorgić, B. M., & Bartik, P., Physical performance predictors in youth breaststroke swimming: motor and biomotor diagnostic differences, BMC Sports Science, Medicine and Rehabilitation, 2025.
7. Kwanphet, N., & Choeychom, K., The effects of complex training on breaststroke performance of young swimming athletes, Academic Journal of Thailand National Sports University, 16(2), 2024, 69–78.
8. Lee, H.-Y., Chao, T., Hsu, C.-C., Chang, N.-W., Chen, Y.-L., & Tsai, Y.-S., Effects of different warm-up methods on 50-meter breaststroke swimming performance, Frontiers in Bioengineering and Biotechnology, 12, 2025, 1505648.
9. McGinnis, P. M., Biomechanics of Sport and Exercise (3rd ed.), Human Kinetics, 2013.
10. Mustafa, A. O. O., Movement is the key to learning (1st ed.), Al-Wafaa Publishing, 2011.
11. Nabil, A., Educational measurement and evaluation (1st ed.), Wael Publishing and Distribution House, 1999.

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12. Naruebes, K., & Choeychom, K., The effects of complex training on breaststroke performance of young swimming athletes, Academic Journal of Thailand National Sports University, 2024.
13. Rastovski, D., Zoretic, D., & Đurović, M., Trends in swimming competence among youth: A repeated cross-sectional study (2020–2024), Youth, 5(4), 2025, 117.
14. Rastovski, D., Zoretic, D., & Đurović, M., Trends in swimming competence among youth: a repeated cross-sectional study (2020–2024), Youth, 5(4), 2025, 117.
15. Saber, F. A., & Khafaga, M. A., Fundamentals and principles of scientific research, Al-Ishaa Technical Library and Printing, 2003.
16. Todd, P., Giuseppe, C., & Hayley, S. L., Physical performance determinants in competitive youth swimmers: a systematic review, BMC Sports Science, Medicine and Rehabilitation, 16, 2024, 20.
17. Zaki, A. M., Teaching and Training Swimming Techniques for Rescue, Dar Al-Fikr Al-Arabi, 2002.

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