

"The Effect of a Sensorimotor Program on the Development of Sensorimotor Aspects in Primary School Pupils Aged 10–11 Years – A Field Study in the Municipality of Barhoun."

اثر برنامج حسي حركي على تنمية الجوانب الحسية الحركية لدى تلاميذ الطور الابتدائي 10-11 سنة -
دراسة ميدانية على مستوى بلدية بهوم-

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Received: 13/07/2025

Accepted: 13/08/2025

Published:30/09/2025

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Abstract:

This study aims to explore the fundamental and positive role of a sensorimotor program in the school environment, particularly in enhancing the sensorimotor aspects of primary school pupils aged 10–11 years. The research involved the application of a set of sensorimotor exercises in addition to the standard school curriculum. The study was conducted on a sample of 36 fifth-grade pupils, divided into two groups: a control group that followed only the traditional school curriculum, and an experimental group that followed the same curriculum supplemented with a proposed program consisting of individual and group activities designed to achieve sensorimotor objectives. The experimental method was employed, and specific tests were used to assess sensorimotor development, including standing long jump, shooting accuracy, shot put, and motor speed. The results indicated a significant and positive impact of the sensorimotor program on the development of sensorimotor skills in the experimental group. The study recommends integrating such programs into the school curriculum and encouraging teachers to adopt them due to their effective role in supporting the sensorimotor development of primary school pupils.

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The effect of a proposed sports rehabilitation program on improving the functional efficiency of the spine in women with non-specific low back pain

Keywords: Sensorimotor program, sensorimotor skills, primary school pupils, experimental method, physical education

المخلص:

تهدف هذه الدراسة إلى معرفة الدور الأساسي والإيجابي الذي يلعبه البرنامج الحسي الحركي في الوسط المدرسي، وخاصة في ميدان تنمية الجوانب الحسية الحركية لدى تلاميذ الطور الابتدائي (11/10 سنة)، من خلال تطبيق مجموعة من التمارين الحسية الحركية إلى جانب المنهاج المدرسي المقرر، وقد أجريت الدراسة على عينة مكونة من 36 تلميذا من السنة الخامسة ابتدائي، تم تقسيمهم إلى مجموعتين: مجموعة ضابطة خضعت فقط للمنهاج المقرر المدرسي العادي (التقليدي) ومجموعة تجريبية خضعت للمنهاج المقرر المدرسي العادي (التقليدي) بالإضافة إلى برنامج مقترح من خلال أنشطة فردية وجماعية مبنية على تحقيق الأهداف الحسية الحركية، وذلك باستخدام المنهج التجريبي. تم اعتماد اختبارات لقياس الجوانب الحسية الحركية شملت القفز من الثبات، التصويب، رمي الكرة، والسرعة الحركية. حيث أظهرت النتائج وجود أثر إيجابي وفعال للبرنامج الحسي الحركي في تنمية الجوانب الحسية الحركية لتلاميذ المجموعة التجريبية. واقتُرحت الدراسة ضرورة إدراج مثل هذه البرامج ضمن المنهاج المدرسي، وتشجيع الأساتذة على تبنيها لدورها الفعال في دعم النمو الحسي الحركي لتلاميذ الطور الابتدائي.

الكلمات المفتاحية: البرنامج الحسي الحركي، الجوانب الحسية الحركية، تلاميذ الطور الابتدائي، المنهج التجريبي، التربية البدنية

1. Introduction and Problem Statement

The school is an educational institution with a social and pedagogical function. Its educational role lies in building an integrated society capable of keeping pace with the economic, social, and technological developments of life. In addition, it plays a crucial role in shaping the human personality on intellectual, physical, and psychological levels. School sports activities, in general, serve as a tool used by the school to educate its pupils. The primary purpose of these activities is not merely to allow pupils to engage in the activities they enjoy, but rather to fulfill the school's social and educational function. These activities

aim to develop and refine the pupils' experiences and to train them through participation in various activities that instill proper social habits and behavior required by the society in which they live—helping them become productive and accomplished individuals. (Rabehi Mohamed & Azizou Mohamed Azziz, 2023, p.2)

2. General Research Question:

What is the impact of the proposed sensorimotor program on the development of sensorimotor skills among primary school pupils aged 10–11 years?

3. Study hypothesis:

General Hypothesis: The proposed training program has a statistically significant positive effect on improving certain motor and physical skills among the experimental group compared to the control group.

4. Significance of the Study

This study aims to understand the role of physical and sports activities in developing the sensorimotor aspects of primary school pupils and enhancing their perceptual and cognitive skills. Its significance lies in its focus on a sensitive age group (10–11 years), where sensorimotor programs contribute to the development of fundamental motor abilities such as balance, accuracy, coordination, and speed. The study also holds scientific and practical value by presenting an applicable model within the school environment. Additionally, it is based on an experimental approach that provides accurate results, which can assist teachers and educators in

improving their pedagogical methods to support sensorimotor development among pupils.

5. Study terms:

- **Physical and Sports Education:** Physical and sports education considers the individual mentally, religiously, and politically, aiming to form a well-rounded individual who contributes to building a strong and cohesive society. It should not be viewed narrowly as merely physical development, but rather as a comprehensive and integrated formation encompassing intellectual, social, and psychological aspects. (Belal, Fateh, Youssef, 2023, p.198)
- **Sensorimotor Domain:** Technically, it refers to the perception that gives us awareness of the body in space. We can perform movements without relying on our five senses; however, it sometimes involves what is known as muscular sensation. This sense allows us to perceive the level and degree of muscle contraction required to perform any movement. This learning process occurs through three progressive stages: raw, refined, and stable. It signifies the development of motor memory's understanding of the movement pattern and the necessary requirements to perform it, ensuring balanced neuromuscular coordination for successful execution by regulating muscle contractions in terms of degree and force. (Goursi Jamal Eddine, Kara Al-Nadhir, 2022, p.3)
- **Learning:** Learning is a relatively permanent change in behavior resulting from activity performed by the individual, training, or observation, and not due to natural maturation or temporary conditions.

It involves behavioral modification through practice. (Amin Anwar Al-Khouli et al., 1998, p.84)

- **Concept of Growth:** Growth is the science concerned with studying the life stages of a living organism from its inception, aiming to understand its physical and mental development. Growth includes various changes—chemical, physiological, natural, psychological, and social—that begin from fertilization and continue until the full maturation of the individual's vital functions. (Marwan Abdul Majid Ibrahim, 2001, p.12)
- **Motor Activity:** Motor activity is one of the main means through which children learn behaviors, acquire attitudes, skills, and values appreciated by society. Movement is measured through three factors: time (the interval between two points), space (the area confined between points), and dynamics (the driving force of the body, with force being the primary factor controlling movement). (Afaf Othman Othman, 2013, p.22)
- **Perceptual-Motor Abilities:** These are acquired traits from the environment, with training and practice as their foundation. They develop according to the individual's physical, sensory, and perceptual capabilities. These traits include skills such as agility, balance, and flexibility. (Wajih Mahjoub, 2002, p.11)
- **Sensory Perception:** It is the process by which an individual becomes immediately aware of something. Sensory perception occurs when the object perceived directly affects one of our sensory organs. (Saleh Qasim Hussein, 1982, p.162)

Primary School: *Definition:* It is the type of formal education that caters to pupils aged six to twelve years, providing them with spiritual, physical, intellectual, social, and emotional care in a manner consistent with the nature of the child and the goals of the society in which they live. (Mohamed Ali Ahmed Al-Shahri, 2009, p.119)

Terminologically: It is a public educational institution that includes the first and second cycles of basic education. It operates with near independence from the sports or complementary school, except in matters related to educational coordination and financial affairs. (Ben Salem, 2000, p.54)

Operationally: It is an educational institution comprising teachers, principals, administrators, and pupils, where various instructional activities are conducted, including physical education, which is facilitated by a teacher along with pupils in the school yard equipped with sports facilities. (Ben Salem, 2000, p.54)

Program: Demerdash Sarhan defines a program as "a set of organized experiences in a specific educational subject, designed with a particular goal to be achieved, linked with a specific schedule and resources." Amin Anwar Al-Khouli describes it as "a plan prepared for an individual, a class, or a school. This plan may cover a part of the academic year, a full school day, a month, a semester, or an entire academic year. The program outlines the activities to be implemented within the classroom." (Afaf Othman, 2007, p.27)

Primary Education: A child enters primary school at the age of six after spending early childhood at home and in the surrounding environment, where they acquire habits, information, emotions, and initial experiences. Through this process, the child's personality begins to form, which varies from one pupil to another due to differences in habits, behaviors, prior experiences, as well as intellectual and physical abilities. The primary school is responsible for educating this diverse group of pupils. This stage of growth, spanning ages 7 to 12, is referred to as **late childhood**, distinguishing it from the earlier stage of early childhood. (Marwan Abdul Majid Ibrahim, 2002, p.49)

➤ **Goal of Physical Education in Primary Stage:**

The objective of motor activity is to develop and enhance the natural motor abilities and skills of the child through guided free practice of fundamental activities and skills. This aims to achieve balanced comprehensive growth physically, skillfully, cognitively, and behaviorally, to instill correct, upright, ethical, and socially sound habits. (Hassan Al-Sayed Abu Abduh, 2011, p.17)

✚ **General Objectives of Educational Activities and Practical Skills for Primary School Grades One, Two, and Three**

1. To develop in the pupil practical skills that contribute to the growth of all fields of arts, activities, and scientific domains.
2. To encourage the pupil to practice positive attitudes, such as an inclination towards manual work.
3. To enable the pupil to engage in healthy social activity through teamwork and performing various social roles.

4. To help the pupil utilize acquired skills to develop hobbies suited to them, occupying their free time in ways that contribute to enjoyment, happiness, and playfulness, while steering clear of future deviations.
5. To encourage the pupil to apply the skills gained in various fields and activities to simple tasks necessary in daily life.
6. To cultivate the pupil's ability to appreciate artistic, aesthetic, and moral values.
7. To raise the pupil's awareness of certain concepts that impact their life, in a manner appropriate to their age and content. These concepts include (tourism environment, national security and safe traffic, political and legal education, addiction prevention, health and environment, housing, global education, and education for peace). (Hassan Al-Sayed Abu Abduh, 2011, p.19)

6. Previous Studies:

- **Study by Taybi Hussein et al. (2012/2013):** The study titled *"The Effect of a Motor Education Program on the Development of Basic Motor Skills and Motor Abilities among Fourth Grade Primary Pupils (9–10 years old)"* was conducted by the Laboratory of Physical, Sports, and Artistic Activity Sciences and Practices. The aim of this study was to investigate the effect of a proposed motor education program on developing some basic motor skills and motor abilities in primary school children. The experimental method was used with a pretest-posttest design involving control and experimental groups. The study population consisted of 80 male fourth-grade pupils aged 9–10, enrolled in the 2012/2013 academic year at Tabash Mohamed and Hussein Qasimi Schools in Wadi Fadda, Chlef. The sample included 26

pupils deliberately selected and divided into two homogeneous groups: experimental and control. The study results showed: No statistically significant differences between the pretest and posttest means for the control group. Statistically significant differences between the pretest and posttest means for the experimental group. Statistically significant differences between the posttest means of the basic motor skills tests for both experimental and control groups, favoring the experimental group. Statistically significant differences between the posttest means of the basic motor abilities tests for both experimental and control groups, favoring the experimental group.

- **Abdelhamid Al-Ghroul Yahyaoui Al-Saeed (2017):** *The Effect of the Physical Education Curriculum on Improving Some Basic Transitional Motor Skills (Running, Jumping, and Hopping) among Primary School Pupils Aged 6–7 Years.* This study aimed to develop educational units based on the curriculum, the accompanying curriculum document, and the educational guide for physical education. It sought to determine their effect on improving basic motor skills among primary school pupils aged 6–7 years. The study also aimed to identify differences in the improvement of transitional motor skills (running, jumping, hopping) following the implementation of these educational units. The researchers used an experimental method with a control and experimental group design and pretest-posttest measurements. The study population consisted of pupils enrolled in single-shift education at Alawi Ahmed Primary School. The total research population was 22 male and 33 female pupils registered in second-grade classes. A purposive sample of 40 pupils was selected, including 14 boys and 14 girls. Additionally, 90 pupils were selected to perform psychometric assessments of motor tests. The results indicated: Statistically

significant improvements in some basic transitional motor skills (running, hopping, jumping) within the experimental group. No statistically significant differences between the experimental and control groups in some basic transitional motor skills (running, hopping, jumping), except for a statistically significant difference in the quadruple jump test.

➤ **Study by Ata Allah Shehrazad, Ben Khaled Haj, Tawati Hayat, Ata Allah Ahmed (2022):**

The study aimed to investigate the effect of a physical and sports activities program on auditory perception in elementary school students with learning difficulties.

The researchers used an experimental method with two groups (experimental and control), totaling 40 students, 20 in each group, selected purposively from elementary students with learning difficulties. The results showed that the program based on physical and sports activities had a positive effect on visual perception in students with learning difficulties.

➤ **Study by Marqasi Amna and Boutalbi Ben Jedou (2021):**

This study aimed to determine the effect of a proposed motor education program on developing sensory-motor perception in preschool children. The researchers used the experimental method on a purposive sample of 40 children and applied the Haywood scale for sensory-motor abilities. The results revealed that the proposed program positively impacted the development of sensory-motor perception in children.

7. Exploratory Study:

The exploratory study is considered the first step toward understanding all aspects of the research by identifying the study variables and formulating the research hypotheses accordingly. The exploratory study is defined as a scientific investigative study aimed at identifying the problem. The need for this type of research arises when the problem under study is new and has not been previously addressed, or when the information or knowledge obtained about the problem is scarce and weak. (Belkheir & Qatoush, 2023, p. 7)

The exploratory study aims to collect data related to the topic of the research and information about the sample. Firstly, the researcher conducted a preliminary exploratory study in order to verify the validity and effectiveness of the research tools in measuring the psychomotor aspects among primary school pupils, as well as to test the pupils' understanding of the instructions and their correct performance of the approved tests (standing long jump, shooting, shot put, and motor speed). This study was applied to an exploratory sample consisting of 10 to 12 pupils from the same age group (10–11 years) and the same educational level (fifth grade of primary school), without including their results in the main research sample.

Result of the Exploratory Study: The exploratory study demonstrated the validity of the approved tests (standing long jump, shooting, shot put, and motor speed) for measuring the psychomotor aspects among primary school pupils. It was confirmed that the instructions were clear and easy for the pupils to understand. A need was identified for some minor adjustments in the organization of the exercises to ensure smooth implementation. The availability of the necessary materials and equipment for executing the psychomotor program was verified.

Study

Method:

The method is the path that guides the researcher to uncovering the truth in sciences through a set of scientific principles (**Belkheir & Qatoush, 2023, p.7**). The researcher used the experimental method with a single-group pre-test/post-test design, as it is appropriate for the study's problem. This approach involves only one group, which first undergoes a pre-test to determine its status before introducing the experimental variable. The group is then exposed to the variable, followed by a post-test. The difference in the group's results between the pre- and post-tests is attributed to the influence of the experimental variable.

Study Population and Sample: The research population consisted of 36 pupils from *1st November Primary School* in Barhoum. The study sample was selected intentionally or purposively. Their level of psychomotor perception was assessed through the application of selected tests.

Data Collection Tools: To organize this study and collect data, after reviewing several studies and references, I was able to prepare a set of tests recommended by experts—psychomotor tests suitable for children aged 10–11 years. The tests included: Shot put test; Standing long jump test; Motor speed test; Shooting test

Experimental Study Steps:

Pre-test:

The pre-tests were conducted for all members of the study sample on Sunday, February 16, 2025, at 2:00 PM. These included the psychomotor perception tests.

Main**Experiment:**

A program was implemented that included simple movements and small games aimed at developing the psychomotor aspects of the target group, taking into account their motor abilities as determined through my review of scientific sources.

The program was applied to the study sample starting on Monday, February 17, 2025. It comprised twelve training sessions conducted three times a week, on Sundays, Mondays, and Wednesdays. Each session lasted between 40 and 45 minutes.

The program was completed with the study participants on Thursday, March 15, 2025.

The instructional units in the first week focused on physical exercises intended to enhance the general physical readiness of the study sample. The objectives were to achieve preparedness, acceptance and familiarity, active and interactive participation, time management, and ensuring the availability of a suitable space. Each unit lasted between 40 and 45 minutes.

Subsequently, the program's specific units were implemented. These included small games, physical exercises, psychomotor activities and games, as well as basic motor skills such as walking, running, jumping, throwing, and shooting. The purpose of these activities was to develop psychomotor perception.

Post-test:

After completing the program, I conducted the post-tests for the sample members on Monday, March 15, 2025, at 2:00 PM, in the same manner and under the same conditions as the pre-tests.

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Discussion of the Results:

Analyzing the initial characteristics of the sample is a fundamental step in any experimental study, as it helps verify the degree of homogeneity between the two study groups (control and experimental) prior to the application of the independent variable.

In this context, Table (01) presents the individual values of the variables: age (in months), weight (in kilograms), and height (in centimeters) for both the control and experimental groups.

By examining these data, the goal is to determine whether there are significant differences between the two groups in terms of these demographic variables, which could potentially affect the outcomes of the experiment. Similar averages across these variables strengthen the credibility of the comparison and reduce the likelihood of external factors influencing the final results. Conversely, if there are evident differences between the two groups in any of these variables, this should be taken into account when interpreting the experimental findings.

Based on this table, the following paragraphs will present a detailed statistical analysis and discussion of these results to assess the degree of homogeneity between the two groups at the outset of the study.

Table No. (01): Statistical Results of Age, Height, and Weight Variables
Between the Control and Experimental Groups|

Control Group			Experimental Group			N°
Height (cm)	Weight (kg)	Age (months)	Height (cm)	Weight (kg)	Age (months)	

139	32	128	150	40	124	1
143	33	126	148	35	126	2
145	57	130	148	44	122	3
155	40	137	145	48	119	4
147	32	129	132	38	121	5
145	30	131	148	35	123	6
140	58	118	135	27	123	7
145	42	121	143	30	126	8
145	35	160	140	30	133	9
138	26	128	145	33	130	10
133	31	137	150	40	126	11
140	32	128	148	34	131	12
160	49	129	140	35	119	13
135	31	118	115	35	154	14
147	33	131	140	25	124	15
136	33	123	141	41	126	16
142	33	131	150	37	130	17
150	50	127	147	56	160	18

Presentation and Analysis of the General Hypothesis Results:

The general hypothesis states that the proposed training program has a statistically significant positive effect on improving some motor and physical skills among the experimental group individuals compared to the control group.

To ensure the equivalence of the control and experimental groups before applying the training program, a statistical comparison was conducted between

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them on several basic variables (age, height, weight), using the independent sample t-test. The aim was to verify the absence of prior significant differences that could affect the credibility of the subsequent results. The following table presents the statistical values for these variables:

Table (02): Statistical Significance of Differences Between the Control and Experimental Groups in Basic Variables (Age, Height, Weight) Before Applying the Training Program.

Statistica l func tion	Signi fican ce level	De gre es of fre edo m	Tab ulat ed t valu e	Calc ulat ed T valu e	Experimen tal Group		Control Group		Unit of Meas urem ent	Vari abl es
					Sta nda rd Dev iati on (SD	Arit hme tic Mea n	Sta nda rd Dev iati on (SD)	Arit hme tic Mea n		
Not sign ifica nt	0.05	17	2.11 0	- 0,25 2	10,7 435	128, 722 2	8,98 90	129, 555 6	Mont h	Age
Not sign ifica	0.05	17	2.11 0	- 0,44 0	8,38 82	142, 500	6,65 11	143, 611 1	Centi meter	Hei ght

nt										
Not sign ifica nt	0.05	17	2.11 0	- 0,27 9	7,25 91	36,8 333	9,32 82	37,6 111	Kilogr am	Wei ght

Based on the results of Table (02), which presents the statistical values related to the variables of age, height, and weight for both the control group and the experimental group, it is evident that the differences between the two groups in these pre-test variables are not statistically significant at the 0.05 significance level.

The mean age in the control group was (129.56 months) with a standard deviation of (8.99), while the mean age in the experimental group was (128.72 months) with a standard deviation of (10.74). Despite the slight difference in means, the calculated t value was (-0.252), which is far below the tabulated t value of (2.110) at (17) degrees of freedom and a 0.05 significance level, indicating that this difference does not reach statistical significance.

Similarly, for the height variable, the control group recorded a mean of (143.61 cm), compared to (142.50 cm) in the experimental group, with a standard deviation of (6.65) and (8.39), respectively. The statistical comparison yielded a calculated t value of (-0.440), which is also lower than the tabulated value, demonstrating the absence of a significant difference between the groups in this variable.

Regarding weight, the control group had a mean of (37.61 kg) with a standard deviation of (9.33), compared to a mean of (36.83 kg) and a standard deviation of (7.26) in the experimental group. The calculated t value in this case was (-0.279), which, as in the previous instances, is below the critical t value of (2.110), indicating that the difference is not statistically significant.

These results clearly show that all differences between the control and experimental groups in the three variables (age, height, and weight) are not statistically significant at the adopted significance level (0.05). Accordingly, it can be stated that the two groups were equivalent at the pre-test stage regarding the studied physical and biological characteristics, providing a solid scientific basis for interpreting any subsequent differences observed in the dependent variables as a result of the intervention or applied experiment.

The importance of this pre-test equivalence lies in the fact that it is a fundamental prerequisite to ensure the internal validity of the study results. When the two groups are equal in characteristics that could influence the experiment outcomes, any subsequent changes in performance or results can be attributed to the effect of the experimental treatment rather than to external factors or pre-existing differences among the participants.

Moreover, the small magnitude of the calculated differences and the negative t values of limited size indicate that the direction of the differences was not even in favor of one group over the other. Rather, the natural variability among individuals may explain these minor differences, which is common in human studies. This conclusion is further supported by the similar standard deviation values between the two groups, indicating a relative homogeneity in the data.

In light of the above, these results confirm the validity of the experimental design of the study and enhance confidence in the methodological procedures followed when dividing the sample into two groups. They also support the neutrality in the distribution of participants and lend greater statistical power to the subsequent analysis of the main study variables.

To verify the effectiveness of the training program applied to the experimental group, a statistical comparison was conducted between the results of the control and experimental groups in the scoring and shooting test, both in the diagnostic (pre-test) and achievement (post-test) measurements. The independent samples *t*-test was used to determine the significance of the differences between means. The following table presents the statistical values related to this test:

Table (03): Statistical significance of the differences between the control and experimental research groups in the scoring and shooting test.

Significance level	Degrees of freedom	Tabulated t value"	Calculated T value	Experimental Group		Control Group		Variables	Scoring and shooting test
				Standard deviation	Arithmetic mean	Standard deviation	Arithmetic mean		
0,05	17	2.110	-0,1039	1,7648	4,9444	2,0718	4,8778	Diagnostic measu	

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0,05	17	2.110	- 2,64499	0,9672	8,3611	1,6539	7,1667	Achievement measurement	

As part of the analysis of the scoring and shooting test results, a comparison was conducted between the performance of the control and experimental group participants in both the diagnostic and achievement measurements, using the independent samples *t*-test in order to determine whether there were statistically significant differences attributable to the impact of the training program applied to the experimental group.

Regarding the diagnostic measurement, the results showed that the control group had an arithmetic mean of (4.8778) with a standard deviation of (2.0718), while the experimental group had a mean of (4.9444) with a standard deviation of (1.7648). The calculated *t* value was (-0.1039), which is less than the tabulated *t* value (2.110) at (17) degrees of freedom and a 0.05 significance level. This result indicates that there were no statistically significant differences between the two groups in this measurement, demonstrating that the groups were equivalent in their skill performance levels prior to the implementation of the training program.

With respect to the achievement measurement, the control group recorded a mean of (7.1667) with a standard deviation of (1.6539), whereas the

experimental group achieved a higher mean of (8.3611) and a lower standard deviation of (0.9672). The statistical analysis yielded a calculated t value of (-2.64499), which exceeds the tabulated value (2.110), indicating the presence of a statistically significant difference between the two groups in this measurement.

These results clearly demonstrate that the members of the experimental group achieved a noticeable improvement in their scoring and shooting skill performance compared to their counterparts in the control group, reflecting the effectiveness of the implemented training program. Additionally, the lower standard deviation in the experimental group indicates greater homogeneity in performance and a relatively uniform improvement among participants, which further reinforces the credibility of the program's impact.

Accordingly, it can be concluded that the training program contributed positively to developing skill performance in shooting and scoring, thereby supporting the recommendation to adopt it within programs aimed at enhancing motor skills of a technical nature in sports activities.

In the context of measuring the impact of the proposed training program on developing the participants' motor ability, a motor speed test was conducted for both the control and experimental groups during the diagnostic and achievement measurement phases. The independent samples t -test was applied to verify whether statistically significant differences existed between the groups' results, as presented in the following table:

Table (04): Statistical significance of the differences between the control and experimental research groups in the motor speed test.

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Signif icance level	Deg rees of free do m	Tabu lated t valu e	Calcu lated T value	Experimenta l Group		Control Group		variabl es	M oto r sp ee d tes t
				Stan dard devi atio n	Arith metic mean	Stan dard devi atio n	Arith metic mean		
0,05	17	2.11 0	- 0,636 4	0,35 66	4,367 2	0,43 08	4,283 3	Diagno stic measu rement	
0,05	17	2.11 0	- 2,894 81	0,34 47	4,642 8	0,34 16	4,311 7	Achiev ement measu rement	

As part of assessing the impact of the proposed training program on developing motor speed among the study sample, the motor speed test was administered to both the control and experimental groups in both the diagnostic (pre-test) and achievement (post-test) measurements. An independent samples *t*-test was used to analyze the statistical significance of the differences between the results of the two groups.

Regarding the diagnostic measurement, the arithmetic mean performance of the control group was (4.2833) with a standard deviation of (0.4308), while the experimental group recorded a mean of (4.3672) with a standard deviation of

(0.3566). The calculated t value was (-0.6364), which is less than the tabulated t value (2.110) at (17) degrees of freedom and a significance level of (0.05). This result indicates the absence of statistically significant differences between the two groups in the pre-test measurement, confirming that the groups were equivalent in motor speed prior to implementing the training program.

In the achievement measurement, however, the results showed a clear improvement in the performance of the experimental group, which achieved an arithmetic mean of (4.6428) with a standard deviation of (0.3447), whereas the control group recorded a lower mean of (4.3117) with a standard deviation of (0.3416). The calculated t value was (-2.89481), which exceeds the tabulated value (2.110), indicating the presence of statistically significant differences in favor of the experimental group.

These findings demonstrate that the training program effectively contributed to improving motor speed among the experimental group participants compared to the control group, reflecting the efficacy of the intervention in developing this important physical attribute. Moreover, the similar standard deviations between the groups in the post-test measurement suggest that the improvement was consistent among most experimental group members, with little variability in performance.

Based on the above, it can be concluded that the implemented training program had a noticeable positive effect in enhancing motor speed, supporting its potential use in preparatory or therapeutic programs aimed at developing physical abilities related to rapid motor performance.

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Within the framework of evaluating the effectiveness of the training program applied to the experimental group in developing certain physical skills, the long jump test was conducted as an indicator of lower-limb muscular and explosive power. This test was administered in two phases: the diagnostic (pre-test) and the achievement (post-test) measurements for both the control and experimental groups. An independent samples *t*-test was used to determine the statistical significance of the differences, as presented in the following table:

Table (05): Statistical significance of the differences between the control and experimental research groups in the long jump test.

Significance level	Degrees of freedom	Tabulated t value	Calculated T value	Experimental Group		Control Group		variables	Long jump test
				Standard deviation	Arithmetic mean	Standard deviation	Arithmetic mean		
0,05	17	2.110	-1,1393	0,2884	1,4417	0,1787	1,3506	Diagnostic measurement	
0,05	17	2.110	-3,7633	0,1312	1,6617	0,1725	1,4694	Achievement measu	

								rement	
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The results of the diagnostic measurement showed that the arithmetic mean performance of the control group in the long jump test was (1.3506) meters with a standard deviation of (0.1787), while the experimental group recorded a mean of (1.4417) meters with a standard deviation of (0.2884). The calculated t value was (-1.1393), which is less than the tabulated value (2.110) at a significance level of (0.05) and (17) degrees of freedom. This result indicates the absence of statistically significant differences between the two groups in the pre-test phase, demonstrating that the groups were equivalent in their long jump performance before the start of the training intervention.

In the achievement measurement, however, the results of the experimental group improved noticeably, with an arithmetic mean of (1.6617) meters and a standard deviation of (0.1312), while the control group recorded a lower mean of (1.4694) meters and a standard deviation of (0.1725). The calculated t value in this phase was (-3.7633), which exceeds the tabulated value (2.110), indicating the presence of statistically significant differences in favor of the experimental group.

These findings clearly show that the training program had a significant positive impact on enhancing the lower-limb explosive power among the experimental group participants compared to their counterparts in the control group who did not undergo the same intervention. This improvement can be attributed to the focused and structured motor activities included in the program, which specifically targeted strengthening the lower-limb muscles and developing motor performance associated with jumping.

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Based on these results, it can be confirmed that the implemented training program effectively improved long jump performance, highlighting its importance in preparing and guiding trainees toward enhancing their physical abilities directly related to sports performance in activities that require speed and explosive strength.

In order to assess the effectiveness of the training program in developing general muscular strength, the shot put test was adopted as one of the key indicators of physical development among the sample participants. This test was administered to both the control and experimental groups during the diagnostic (pre-test) and achievement (post-test) phases, and an independent samples *t*-test was used to verify the presence of statistically significant differences between the groups’ results, as shown in the following table:

Table (06): Statistical significance of the differences between the control and experimental research groups in the shot put test.

Significance level	Degrees of freedom	Tabulated <i>t</i> value	Calculated <i>T</i> value	Experimental Group		Control Group		variables	Shot put test
				Standard deviation	Arithmetic mean	Standard deviation	Arithmetic mean		
0,05	17	2.110	0,3300	1,4103	5,3778	1,6134	5,5444	Diagnostic measur	

								ement	
0,05	17	2.110	- 2,36765	1,0649	6,8889	1,2244	5,9833	Achievement measurement	

In the diagnostic measurement, the results showed a similarity in performance between the two groups; the control group’s mean performance reached (5.5444) meters with a standard deviation of (1.6134), compared to a mean of (5.3778) meters for the experimental group with a standard deviation of (1.4103). The calculated *t*-value was (0.3300), which is lower than the tabulated value (2.110) at a significance level of (0.05) and a degree of freedom of (17). Therefore, it is evident that there were no statistically significant differences between the two groups at this stage, indicating that they were equivalent in muscular strength prior to the start of the experiment.

In the post-test measurement, noticeable differences emerged between the groups in favor of the experimental group. The mean performance of this group reached (6.8889) meters with a standard deviation of (1.0649), while the control group achieved a mean of (5.9833) meters with a standard deviation of (1.2244). The calculated *t*-value was (-2.36765), which exceeds the tabulated value (2.110), indicating statistically significant differences at the (0.05) level of significance.

These results suggest that the training program contributed to the development of the explosive muscular strength of the experimental group participants, which was positively reflected in the shot put test results. This improvement can be

attributed to the inclusion of specific exercises designed to stimulate the muscles involved in performance and to enhance neuromuscular coordination associated with this skill.

Based on these findings, it can be concluded that the implemented training program has proven effective in improving the physical performance related to pushing strength, making it an effective tool for developing throwing skills in school or sports training settings, especially those relying on maximal muscular strength.

Based on the above presentation and analysis of the statistical results of the scoring and shooting test, motor speed test, long jump test, and shot put test, it is evident that the pre-test measurements did not show statistically significant differences between the control and experimental groups. This confirms their equivalence in the initial level prior to applying the training program.

In contrast, the post-test results demonstrated statistically significant differences in favor of the experimental group in all tests, clearly indicating the effectiveness of the implemented training program in developing the targeted physical and motor skills. Moreover, the consistent improvement observed among the experimental group participants reflects the positive impact of systematic and guided training.

Accordingly, it can be confirmed that the general research hypothesis has been fulfilled, stating that the proposed training program has a statistically significant positive effect on improving the physical and motor performance of the experimental group participants compared to the control group. This result

supports the adoption of such programs in educational and sports environments to achieve effective and sustainable outcomes.

Conclusions and Recommendations

1. Conclusions:

In light of the study results and the processing of statistical data, the following conclusions can be drawn:

- The pre-measurement results showed **no statistically significant differences** between the control and experimental groups, reflecting their **equivalence in the level of physical and skill performance** before implementing the training program.
- The post-measurement results revealed **statistically significant differences in favor of the experimental group** in all the adopted tests (shooting and scoring, motor speed, long jump, and shot put).
- The notable improvement in the experimental group's performance demonstrates the **effectiveness of the proposed training program** in developing the motor and physical skills of the sample participants.
- The statistically significant differences favoring the experimental group confirm that the training program contributed **positively and consistently to improving performance**, compared to the traditional methods applied with the control group.

Through analyzing the study results and processing the statistical data, it can be concluded that the proposed training program had a **clearly positive impact** on developing a range of physical capacities and motor skills among the

experimental group participants. This group showed statistically significant improvements in the tests of shooting and scoring, motor speed, long jump, and shot put, compared to the control group that followed the conventional program. These results are attributed to the nature of the training program, which was characterized by **gradual progression, variety, and a focus on functional movement**. These findings confirm that **good planning and targeted intervention can effectively enhance the physical and skill performance of practitioners**.

2. Recommendations:

Based on the results of the study, the following recommendations are proposed:

- **Adopt the proposed training program** within educational and training plans aimed at developing motor and physical capacities among students and practitioners.
- **Expand the implementation of the program** to larger samples and different age groups to verify its effectiveness across diverse contexts.
- **Integrate diverse training activities** into educational and sports programs that focus comprehensively on developing essential skills and physical capacities.
- **Organize training workshops for teachers and coaches** on how to design and apply effective training programs based on principles of progression, variety, and motivation.
- **Conduct future studies comparing various types of training programs** to identify the most effective in terms of outcomes and impact on motor performance.

In view of the statistical and educational evidence produced by the study, it is recommended to **generalize and adapt the adopted training program** for different age groups and educational stages, given its proven effectiveness in developing motor skills and physical capacities. It is also suggested to **support continuous professional development for teachers and coaches** in designing and implementing scientifically grounded training programs, as well as to enhance the integration of practical and applied aspects in the educational process. Additionally, it is recommended to **conduct future studies comparing different training programs** to determine the most suitable approaches according to the nature of the target group and the specified objectives

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