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The Effect of a Proposed Training Program Using Mental Training on Developing and Improving Certain Cognitive-Motor Abilities in U17 Handball Players: A Field Study in Selected Clubs Active in the Handball League of Djelfa Province

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Abstract:

The current study aims to investigate the impact of training programs based on mental (cognitive) training adopted by coaches in handball on their players. This sport demands a high level of focus, imagination, and anticipation, requiring advanced sensory-cognitive-motor abilities. A handball player must exhibit excellent neuromuscular coordination to perform the game's skills effectively. Motor coordination, particularly hand-eye coordination, is crucial for dribbling and shooting, while foot-eye coordination is essential for body feints and jumping.

All these elements necessitate that coaches of such age categories adopt training programs rooted in mental training to enhance the performance of players, especially in sports requiring such advanced cognitive-motor abilities. This necessity drove us to undertake this study

The sample consisted of 50 U17 handball players, and the T-test was used as the statistical method for analyzing the collected data

Keywords: Effect, Proposed Training Program, Mental Training, Improvement, Development, Cognitive-Motor Abilities, U17 Handball Players

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1. Introduction and Research Problem:

Focusing exclusively on the physical, technical, and tactical aspects of training while neglecting other equally crucial dimensions in sports preparation represents a core concern for those responsible for preparing our national teams. Athletic success and team achievements depend on adopting various training methodologies that have been widely practiced for a long time, demonstrating their effectiveness, confirming their significance, and contributing substantially to achieving excellence and breaking records**. (Al-Amin, 2015, p.139).**

Sports hold a significant place in the global direction of nations and societies, occupying a key role in planning and execution to achieve advanced results. Athletic performance has become one of the indicators of progress and development in modern societies **(Zamali, 2022, p.15).**

Mental training is one of the critical dimensions of modern sports training. Its application has become increasingly widespread, especially in high-performance sports, after extensive research highlighted its role in skill acquisition, motor development, preparation for competitions, and providing cognitive strategies that play a crucial role in achieving excellence **(Shimon, 1996, p.5).**

Motor perception is of great importance in all coordination movements and daily and sports activities. It is considered a cornerstone in building human knowledge, assisting individuals in comprehending and acquiring motor abilities. This process relies heavily on the integrity of the sensory-nervous system and its degree of development **(Khashaymiya & Dasa, 2021, p.105).**

Based on the aforementioned points, this study aims to investigate the effectiveness of a proposed training program using mental training to develop and improve certain cognitive-motor abilities in U17 handball players.

Research Question:

Does the proposed training program using mental training affect the development and improvement of certain cognitive-motor abilities in U17 handball players?

Sub-Questions:

Does the proposed training program improve attention in U17 handball players through mental training?

Does the proposed training program improve perception in U17 handball players through mental training?

Does the proposed training program improve visualization in U17 handball players through mental training?

Does the proposed training program improve planning in U17 handball players through mental training?

Does the proposed training program improve coordination in U17 handball players through mental training?

2. Research Hypotheses:

2.1. General Hypothesis:

The proposed training program positively affects the development and improvement of certain cognitive-motor abilities in U17 handball players through mental training.

2.2. Sub-Hypotheses:

The proposed training program improves attention in U17 handball players through mental training.

The proposed training program improves perception in U17 handball players through mental training.

The proposed training program improves visualization in U17 handball players through mental training.

The proposed training program improves planning in U17 handball players through mental training.

The proposed training program improves coordination in U17 handball players through mental training.

3. Research Objectives:

The current study aims to:

Determine the effectiveness of the proposed training program in developing and improving certain cognitive-motor abilities in U17 handball players through mental training.

Assess the impact of the proposed training program on improving attention in U17 handball players through mental training.

Evaluate the effect of the proposed training program on enhancing perception in U17 handball players through mental training.

Measure the influence of the proposed training program on improving visualization in U17 handball players through mental training.

Investigate the effect of the proposed training program on developing planning in U17 handball players through mental training.

Examine the impact of the proposed training program on enhancing coordination in U17 handball players through mental training.

4. Significance of the Study:

The significance of the current study lies in assessing the effectiveness of the proposed training program using mental training to develop and improve cognitive-motor abilities in U17 handball players. It aims to highlight the role of the coach in designing and implementing mental training programs tailored for handball players.

Handball, as a sport, demands high levels of focus, imagination, and anticipation, along with advanced sensory-motor cognitive abilities. Players must exhibit strong neuromuscular coordination to perform handball skills effectively. Specifically:

Hand-eye coordination is essential for dribbling and shooting.

Foot-eye coordination is critical for performing body feints and jumping effectively.

This emphasizes the importance of adopting training programs rooted in mental preparation to elevate the performance of players, particularly in sports demanding such advanced cognitive and physical integration.

5. Operational Definitions of Key Terms and Concepts:

5.1. Training Program:

In this study, a training program refers to a set of planned and organized sports activities designed according to specific criteria. These activities aim to enable handball players to acquire new knowledge and athletic experiences to enhance their performance efficiency in the game.

5.2. Development:

Development in this study refers to a continuous and comprehensive or partial improvement process that athletes undergo to enhance their skills and abilities, which varies according to the desired objective.

5.3. Improvement:

Improvement refers to the athletic training process through which an athlete aims to perfect their pre-existing skills and reach a stage of automatic execution during performance.

5.4. Cognitive Abilities:

Cognitive abilities in this study refer to a set of fundamental skills (perception, attention, visualization, planning, and coordination) controlled by the

brain to perform specific tasks. These abilities are heavily reliant on the nervous system and balance sensory organs.

5.5. Motor Abilities:

Motor abilities refer to a set of fundamental skills (e.g., execution, balance) that determine an athlete's efficiency in performing motor tasks. These skills are influenced by mental abilities and are triggered by external stimuli from the surrounding environment.

5.6. Cognitive-Motor Abilities:

Cognitive-motor abilities in this study refer to a set of fundamental skills linked to the neuromuscular system of the athlete. These abilities involve a complex process starting from receiving an external stimulus, transmitting it to balance sensory organs, selecting an appropriate motor response, and executing it as a muscular motor action.

6. Similar and Related Studies:

6.1. Study by Ahmed Al-Amin (2015):

Title: "The Effect of a Proposed Mental Training Program on Improving the Accuracy of Free Kick Performance in Intermediate Football Players"

Published in: Ma'arif Journal, Vol. 10, Issue 19, pp. 01-12.

Objective: This study aimed to determine whether mental training has an effective and positive role in improving shooting accuracy in intermediate football players.

Methodology: The experimental method was adopted with a sample of 30 players, divided into two groups (15 players in the experimental group and 15 players in the control group) selected through purposive sampling.

Tools Used: Mental ability tests, relaxation ability scale, attention focus grid, visual intelligence test, mental imagery scale, and mental training program.

Results: The study found statistically significant differences between the pre-test and post-test results in skill performance, mental dimensions, imagery skills, and shooting accuracy, favoring the post-test results.

6.2. Study by Hassan Zamali (2022):

Title: "The Effect of a Proposed Mental Training Program Based on Neuro-Linguistic Programming Techniques on Improving Orientation Towards Excellence Dimensions in Handball Players"

Published in: Tafawouq Journal for Sciences and Techniques of Physical and Sports Activities, Vol. 7, Issue 2, pp. 15-11.

Objective: This study aimed to propose a mental training program based on neuro-linguistic programming (NLP) to improve orientation towards sports excellence dimensions in handball players.

Methodology: The experimental method was adopted with a sample of 30 players, divided into two groups (15 experimental and 15 control), selected through random sampling.

Tools Used: Theoretical analysis, psychological tests, proposed training programs, and NLP techniques.

Results: The study concluded that the proposed mental training program significantly improved the orientation towards sports excellence dimensions in favor of the experimental group compared to the control group.

6.3. Study by Salwa Khashaymiya and Badr Al-Din Dasa (2021):

Title: "Measuring Cognitive-Motor Abilities in the Sports Field Among Children: An Analytical Study of the Bordeaux Survey Scale"

Published in: Journal of Sports Performance Sciences, Vol. 3, Issue 1, pp. 27-06.

Objective: The study aimed to highlight the Bordeaux Survey Scale in terms of its domains, evaluation methods, target age groups, theoretical background, and characteristics, facilitating its application in Arabic contexts.

Methodology: A theoretical analysis study showcasing types of tests such as balance and posture test, body image perception test, cognitive-motor matching test, and shape perception test, along with their application domains and optimal values.

Results: The study emphasized that the Bordeaux Survey Scale is a valuable tool for evaluating cognitive-motor abilities in both typically developing children and children with disabilities.

6.4. Study by Hafid Qumini and Rafika Sharabsha (2015):

Title: "A Comparative Study of Some Cognitive (Sensory-Motor) Abilities Between Kindergarten and Preparatory Class Children Aged (5-6) Years: A Field Study in Souk Ahras Province"

Published in: Al-Tahadi Journal, Issue 8, pp. 15-06.

Objective: The study aimed to identify differences in body part recognition abilities between kindergarten and preparatory class children aged 5-6 years.

Methodology: A descriptive comparative approach was used with a sample of 40 children (20 from kindergarten and 20 from preparatory classes), selected through random sampling.

Tools Used: The Haywood Scale for Sensory-Motor Abilities for children aged 5-7 years.

Results: The study revealed statistically significant differences in body part recognition abilities, favoring preparatory class children over kindergarten children.

7. Commentary on Similar and Related Studies:

7.1. Topic Selection:

Our study shares similarities with previous related studies in selecting the topic, particularly regarding the proposed mental training program for handball players.

7.2. Study Objectives:

The objectives align across our study and related research, focusing on understanding the role of training programs based on mental training in enhancing cognitive and motor abilities in both athletes and children.

7.3. Research Methodology:

Our study adopted the experimental method, which aligns with some related studies. However, there are differences with other studies that employed the descriptive method.

7.4. Study Population:

Our study targeted U17 handball players, similar to some related studies. However, other studies focused on football players, kindergarten children, or preparatory class children.

7.5. Study Sample:

The study sample in our research consisted of U17 handball players, selected using purposive sampling. Some related studies also used purposive sampling, while others used random sampling for football players and children.

7.6. Data Collection Tools:

Our study relied on a proposed training program based on mental training as the primary tool for data collection. Other related studies also used skill tests and questionnaires as complementary tools for gathering information.

7.7. Statistical Methods:

Our study used the T-test for statistical analysis, which aligns with some related studies. However, other studies employed alternative statistical methods, such as Chi-Square tests.

7.8. Results:

The results across all studies, including ours, were highly consistent. They collectively highlight the positive impact of proposed mental training programs on cognitive and motor abilities in athletes and children.

7.9. Utilization of Related Studies:

We benefited significantly from related studies, as they provided a theoretical foundation for our research, assisted in constructing the methodological framework, and clarified the research pathway in similar contexts.

8. Methodological Procedures Followed in the Study:

8.1. Research Methodology:

Choosing a specific research methodology depends on factors such as the research topic and the nature of the problem being studied. In this study, we utilized the experimental method, as it aligns with our research objectives.

(Ammar & Mahmoud , 1995 p.136) define the descriptive approach as: "A systematic and scientific method of analysis and interpretation aimed at achieving specific objectives for a particular social situation or problem."

While the descriptive approach was considered, the experimental approach was ultimately selected as the most appropriate method for this study.

8.2. Study Population:

In social sciences, the study population refers to: "A finite or infinite set of predefined elements characterized by shared properties, serving as the focus of observation and investigation."**. (Maurice , 2001, p.298)**

The study population in this research consisted of 80 U17 handball players affiliated with the Djelfa Provincial Handball League.

8.3. Study Sample:

The study employed a purposive sampling technique, selecting a total of 50 U17 handball players, divided into:

25 players in the experimental group

25 players in the control group

All participants were members of the Djelfa Provincial Handball League.

8.4. Data Collection Tool (Proposed Training Program):

8.4.1. Theoretical Framework:

The theoretical foundation relied on Arabic references and sources, extracting valuable theoretical information relevant to the study topic.

8.4.2. Human Resources:

A group of experts and specialists was consulted to provide guidance and insights before applying the program to the study sample.

8.4.3. Program Definition:

The proposed training program consists of exercises requiring players to utilize their cognitive abilities (e.g., perception, attention, visualization, planning, and coordination) and motor skills (e.g., execution, balance). These abilities are controlled by the nervous system and balance sensory organs to execute specific tasks efficiently.

The program emphasizes integrating external environmental stimuli into motor responses, showcasing the efficiency of both cognitive and physical capabilities in handball performance.

Implementation Details:

Preliminary Phase: Applied to the experimental group for two weeks with three weekly sessions.

Final Phase: Applied to the control group in its final form.

9. Study Variables:

9.1. Independent Variable:

The independent variable represents the factor the researcher aims to measure to determine its impact on the studied phenomenon. It is also known as the experimental variable.

In our current study, the independent variable is the proposed training program using mental training.

9.2. Dependent Variable:

The dependent variable is the factor that is influenced or affected by the independent variable. Researchers aim to determine the extent of this relationship.

In our study, the dependent variable is the development and improvement of certain cognitive-motor abilities.

10. Statistical Methods Used in the Study:

After the implementation phase, the collected data was processed and analyzed using the SPSS software through several statistical operations:

10.1. T-Test:

The T-test was used to determine whether there are statistically significant differences in the responses of the participants to the questionnaire.

10.2. Significance Level (Alpha):

The standard error significance level was set at 0.05.

10.3. Degrees of Freedom (df):

Degrees of freedom are calculated as:

$df=N-1df = N - 1df=N-1$

Where N represents the sample size.

10.4. Arithmetic Mean:

The arithmetic mean was used to calculate the standard deviation and compare results among participants.

The formula for the arithmetic mean is:

Where:

Σx: Sum of the values.

N: Number of participants.

10.5. Standard Deviation:

The standard deviation is one of the most accurate measures of data dispersion.

It represents the square root of the average squared deviations from the arithmetic mean.

It indicates how far a given value deviates from the central point.

11. Presentation and Discussion of Research Hypothesis Results:

11.1. Presentation, Analysis, and Discussion of the First Hypothesis:

First Hypothesis Statement: "The proposed training program positively affects the development and improvement of attention in U17 handball players through mental training."

First Hypothesis	Arithmetic Mean	Standard Deviation	T-Test Value	f	Significance Level	Sig Value	Statistical Decision
1.5771	0.66302	97.737	9	.05	0.00	Statistically	

						Significant	

Interpretation of Results: From Table (01), which presents the statistical methods used to test the first hypothesis:

The arithmetic mean was 1.5771.

The standard deviation was 0.66302.

The T-test value was 97.737.

The degrees of freedom (df) were 49.

The significance level (α) was set at 0.05.

The Sig value was 0.00.

By comparing the Sig value (0.00) with the significance level (0.05), it is observed that 0.00 < 0.05, indicating that the result is statistically significant.

Statistical Decision:

The first hypothesis is confirmed, proving that the proposed training program positively affects attention in U17 handball players through mental training.

11.2. Presentation, Analysis, and Discussion of the Second Hypothesis:

Hypothesis Statement: "The proposed training program positively affects the development and improvement of perception in U17 handball players through mental training."

Second Hypothesis	Arithmetic Mean	Standard Deviation	T-Test Value	df	Significance Level	Sig Value	Statistical Decision
1.4943	0.69276	141.469	99	.05	0.00	Statistically Significant	

Table (02): Represents the statistical methods used to process the second hypothesis.

From Table (02), which presents the statistical methods used to process the second hypothesis, we observe:

The arithmetic mean is 1.4943.

The standard deviation is 0.69276.

The T-Test value is 141.469.

The degrees of freedom (df) are 49.

The significance level is set at 0.05.

The Sig value is 0.00.

When comparing the Sig value (0.00) with the significance level (0.05), it is clear that 0.00 < 0.05, indicating statistical significance.

Statistical Decision:

The second hypothesis is statistically significant and thus confirmed.

11.3. Presentation, Analysis, and Discussion of the Third Hypothesis:

Hypothesis Statement: "The proposed training program positively affects the development and improvement of visualization in U17 handball players through mental training."

Third Hypothesis	Arithmetic Mean	Standard Deviation	T-Test Value	df	Significance Level	Sig Value	Statistical Decision
2.1514	0.78118	13.994	9	.05	0.01	Statistically Significant	

Table (03): Represents the statistical methods used to process the third hypothesis.

From Table (03), the results indicate:

The arithmetic mean is 2.1514.

The standard deviation is 0.78118.

The T-Test value is 13.994.

The degrees of freedom (df) are 49.

The significance level is 0.05.

The Sig value is 0.01.

When comparing the Sig value (0.01) with the significance level (0.05), it is observed that 0.01 < 0.05, indicating statistical significance.

Statistical Decision:

The third hypothesis is statistically significant and thus confirmed.

11.4. Presentation, Analysis, and Discussion of the Fourth Hypothesis:

Hypothesis Statement: "The proposed training program positively affects the development and improvement of planning in U17 handball players through mental training."

Fourth Hypothesis	Arithmetic Mean	Standard Deviation	T-Test Value	df	Significance Level	Sig Value	Statistical Decision
2.0429	0.77636	7.337	9	.05	0.025	Statistically Significant	

Table (04): Represents the statistical methods used to process the fourth hypothesis.

From Table (04), the results reveal:

The arithmetic mean is 2.0429.

The standard deviation is 0.77636.

The T-Test value is 7.337.

The degrees of freedom (df) are 49.

The significance level is 0.05.

The Sig value is 0.025.

When comparing the Sig value (0.025) with the significance level (0.05), it is clear that 0.025 < 0.05, indicating statistical significance.

Statistical Decision:

The fourth hypothesis is statistically significant and thus confirmed.

11.5. Presentation, Analysis, and Discussion of the Fifth Hypothesis:

Hypothesis Statement: "The proposed training program positively affects the development and improvement of coordination in U17 handball players through mental training."

Fifth Hypothesis	Arithmetic Mean	Standard Deviation	T-Test Value	df	Significance Level	Sig Value	Statistical Decision
1.6	0.6	62			0.00	Stat	

886	9599	.749	9	.05		istically Significant	

Table (05): Represents the statistical methods used to process the fifth hypothesis.

From Table (05), the results show:

The arithmetic mean is 1.6886.

The standard deviation is 0.69599.

The T-Test value is 62.749.

The degrees of freedom (df) are 49.

The significance level is 0.05.

The Sig value is 0.00.

When comparing the Sig value (0.00) with the significance level (0.05), it is evident that 0.00 < 0.05, indicating statistical significance.

Statistical Decision:

The fifth hypothesis is statistically significant and thus confirmed.

11.6. Presentation and Discussion of the General Hypothesis:

Hypothesis Statement: "The proposed training program positively affects the development and improvement of certain cognitive-motor abilities in U17 handball players through mental training."

Through the presentation, analysis, and discussion of the results of the sub-hypotheses:

"The proposed training program positively affects the development and improvement of attention in U17 handball players through mental training" (First Hypothesis).

"The proposed training program positively affects the development and improvement of perception in U17 handball players through mental training" (Second Hypothesis).

"The proposed training program positively affects the development and improvement of visualization in U17 handball players through mental training" (Third Hypothesis).

"The proposed training program positively affects the development and improvement of planning in U17 handball players through mental training" (Fourth Hypothesis).

"The proposed training program positively affects the development and improvement of coordination in U17 handball players through mental training" (Fifth Hypothesis).

All the sub-hypotheses have been statistically confirmed.

Statistical Decision:

The general hypothesis is confirmed, proving that "The proposed training program positively affects the development and improvement of certain cognitive-motor abilities in U17 handball players through mental training."

12. General Conclusion:

Through the presentation, analysis, and discussion of the hypothesis results, we conclude:

The proposed training program positively affects attention in U17 handball players through mental training.

The proposed training program positively affects perception in U17 handball players through mental training.

The proposed training program positively affects visualization in U17 handball players through mental training.

The proposed training program positively affects planning in U17 handball players through mental training.

The proposed training program positively affects coordination in U17 handball players through mental training.

The proposed training program positively affects certain cognitive-motor abilities in U17 handball players through mental training.

13. Conclusion:

The training process is complex, especially when dealing with youth categories. Mental training requires synchronization between the nervous and muscular systems across different stages, starting from:

Stimulus Reception Mechanism: Receiving stimuli from the external environment via balance sensory organs.

Transmission Mechanism: Processing the information, diagnosing the stimulus, selecting an appropriate motor response, and programming it.

Motor Response Mechanism: Executing the response as a motor action based on the processed information.

Coaches and specialists in sports training must prioritize mental training programs, especially for youth categories, given their significant positive impact on player performance and cognitive-motor abilities.

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