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Psychological Program Effectiveness On Heart Rate And Reaction Time In Runners

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General Background The psychological state of an athlete fundamentally dictates the quality of their performance, deeply influencing decision-making, emotional control, and subsequent physiological responses during high-pressure competition environments. **Specific Background** Within athletics, particularly the 100m sprint, reaction time at the starting phase is heavily dependent on psychological readiness, yet coaches frequently prioritize physical and technical development while neglecting the structured psychological care required to regulate anxiety and tension. **Knowledge Gap** Although the importance of psychological preparation is recognized, empirical research precisely quantifying the physiological outcomes—specifically heart rate, respiratory rate, and reaction time—of structured psychological interventions on 100m sprinters remains insufficiently documented. **Aims** This study aimed to develop a psychological program and evaluate its specific physiological effects on the heart rate, respiratory rate, and reaction time of 100m runners from the College of Physical Education and Sports Sciences. **Results** Utilizing an experimental methodology on a sample of 20 runners divided equally into control and experimental groups, the six-week psychological intervention demonstrated a statistically significant decrease in heart rate and respiratory rate, alongside a substantial improvement in reaction time exclusively within the experimental group. **Novelty** This research distinctly isolates and confirms the direct, measurable physiological benefits—specifically the reduction of stress-induced respiratory and cardiovascular arousal and the acceleration of neuromuscular response—derived from a targeted psychological relaxation and emotional regulation program. **Implications** Coaches and sports educators must systematically integrate structured psychological counseling into routine training regimens to regulate athletes' physiological responses and secure optimal athletic achievement under competitive stress.

Highlights:

- Neglecting psychological preparation in sprinters negatively affects emotional control, leading to sub-optimal physiological responses during competition.
- A structured six-week psychological program significantly lowered heart rate and respiratory rate in 100m sprinters.
- Targeted emotional regulation and relaxation techniques demonstrably improved neuromuscular reaction times at the sprint start.

Keywords : Psychological Program, Reaction Time, Heart Rate, Respiratory Rate, 100m Sprinters

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Introduction:

With the development of psychology, its applications, and trends, it has become psychological programs that are an effective and powerful tool in the sports field, both as a scientific discipline and professional practice, where they have become ... It is one of the most important basic pillars in psychological preparation, through which the role of the coach becomes that of an educator and guide, dealing with his players in the best ways to bring the athlete to the best state of psychological stability to achieve the best achievement.

The psychological state of the player is one of the fundamental factors that determine the quality of athletic performance, as it represents the foundation upon which his ability to learn, make decisions, and control emotions during training and competition is built.1

In this context, during training and competition, the runner is exposed to psychological situations and conditions accompanied by emotion and excitement. Therefore, psychological preparation and readiness has become a necessary and urgent process for the player in order to be able to control his emotions and regulate his behavior. These emotions play an important role in competitive sports tactical situations as a stimulus for motivation that activates and directs behavior during competitive situations.2

Reaction is an important aspect of human life, and in the sports field, it is of great importance in all games that require quick motor responses and are characterized by strength and speed, such as the start in short-distance running and in some team sports such as football, volleyball, basketball, and individual sports such as fencing, boxing, and wrestling. Therefore, we find that scientists of movement and sports education in particular are interested in studying the phenomena that affect the level of athletic achievement, and among these phenomena that have received a great deal of attention from scientists is the study of reaction and the factors affecting it.3

Hence, the importance of research in developing a psychological program based on cultivating self-control, training in emotional regulation, and coping skills to deal with stressful situations become clear, given the problems they face . Hostility resulting from the training and competition process, and what the physiological and psychological changes that occur to it, and the delay in reaction time that may accompany this, make it need special care that accompanies all the training periods , and knowing the effectiveness of this psychological program after training on how to practice it to reach the required psychological stability .

Research Problem:

The starting phase is one of the important phases in the (100m) running event because of its role in determining the performance path of the runner. Reaction time is one of the important variables that reflects the speed of response to the stimulus, especially in short races that require speed and accuracy in response from the first moments of the race. Any delay in response may be reflected in the runner’s subsequent performance, especially since the reaction does not depend on the physical aspect only, but also on good psychological preparation.

Through the researcher's monitoring of athletics training activities Particularly in the 100m sprint, I noticed a clear interest among some coaches in developing physical abilities and improving Technique is important for runners, while the psychological aspect does not receive the same attention. I have noticed that the performance level of some runners declines in races compared to their performance during training, which may be related to the anxiety and tension the runner faces and what may accompany it in terms of changes in some physiological responses, and this in turn may be reflected in the runner’s ability to concentrate and respond at the start of the race.

Hence, the research problem lies in identifying the effect of the psychological program on heart rate, breathing rate, and reaction time, which contributes to providing a scientific basis that can be used in preparing runners psychologically and physiologically and improving their responses in the starting phase.

Research Objectives:

1- Developing and implementing a psychological program for the runners of the team of the College of Physical Education and Sports Sciences in the (100m) event.

2- Identifying the effect of the psychological program on heart rate and respiratory rate in runners the team of the College of Physical Education and Sports Sciences in the (100m) event .
3- Identifying the impact of the psychological program on reaction time in runners The team of the College of Physical Education and Sports Sciences in the (100m) event .

Research hypothesis:
1- For the psychological program Positive effect on heart rate, respiratory rate, and reaction time in runners The team of the College of Physical Education and Sports Sciences in the (100m) event.

Research areas:
• **Human Field :** Runners of the College of Physical Education and Sports Sciences team in the (100m) event - University of Kufa.
• **Time range :** The period from (25/4/2026) until (20/6/2026) .
• **Spatial field :** College of Physical Education and Sports Sciences - University of Kufa.

Research methodology and field procedures:

1. Research Methodology:

The nature of the problem under study determines the nature of the program used; therefore, it was used The researcher uses the experimental method with the design of (two equivalent groups), which is considered "the closest and most truthful way to solve many scientific problems"4 , and the basic idea on which experimental research is based in its simplest form "is related to the law of one variable. If there are two situations that are exactly the same in all respects, and then a certain element is added to one of the situations without the other, then any change or difference that appears after that between the two situations is attributed to the presence of this added element".5

2. Research population and sample:
The research community was defined as the runners of the College of Physical Education and Sports Sciences team at the University of Kufa , numbering (23) runners They were chosen By the method of comprehensive enumeration , (3) runners were chosen from among them for the exploratory sample in a random manner, The remaining number was divided into two groups , a control group and an experimental group, with (10) runners in each group , using a simple random method.

3. Equipment and supplies used in the research:
- A metal tape measure for measuring length.
- Medical scale of Chinese origin.
- (DMK KOLDING) device for calculating heart rate.
- Athletics stadium .
- Whistle to signal the start
- electronic stopwatch
- The graduated ruler for measuring reaction time
- Paper and pens.
- Data Entry Form
- Electronic computer: The researcher used a Lenovo electronic calculator for the SPSS statistics program .
- A manual calculator.

4. Field Research Procedures
4-1Identifying the variables used in the study:
4-1-1 Psychological Program :
4-1-1-1Psychological Program Review :
Before implementing the psychological program , it was presented to a group of expert reviewers in the field of sports psychology to verify that its content was suitable for the objectives. The specified model was then applied in the field in its initial form to a pilot sample similar to the original population, consisting of (3) runners, to ensure its suitability for the sample, to address difficulties and make adjustments through feedback from the pilot sample until the final version was prepared, and then it was applied again to calculate the validity and reliability of this program.
4-1-1-2 Limitations of the psychological program : , the time period it takes, the number of sessions it contains, the duration of each session, and the place where the psychological program is implemented . In light of this, the program took 6 weeks to implement, starting from 1/5/2026 until 15/6/2026 , during which (6) group sessions were conducted at a rate of one session per week.

4-1-1-3 Program Design Procedures :

The program in its initial form:

After completing the previous steps, the researcher designed the psychological program . In heart rate, respiratory rate and reaction time of runners The College of Physical Education and Sports Sciences team, after reviewing the theoretical literature and psychological programs similar to this topic, prepared the contents of the sessions. The program in its initial form consisted of (8) guidance sessions. After designing the program in its initial form, the researcher presented it to a group of specialists and experts. To express their opinions on:

- The extent to which the content of the sessions is valid in terms of specific objectives and techniques.
- The number of sessions included is (8) sessions, and the session time is specified as (45) minutes.

The specialists and experts unanimously agreed on the validity of the psychological program developed by the researcher, and they also agreed on the following:6

- The number of sessions is (6) sessions, and the session time is (40-60) minutes.
- The validity of the content of the sessions and their activities included in the psychological program , with some modifications made to them.

3-4-1-1 Heart rate and respiratory rate:7

1- Heart rate measurement test :

Heart rate is measured using an automatic measuring device of type (DMK KOLDING).

2- Breathing count test:8

the runner's breathing rate per minute, and this is done by following these steps:

the runner sitting in a comfortable position.

• The runner breathes normally, then we count the number of breaths for the runner for a minute of time. This test was done before measuring the heart rate, while the runner was sitting and preparing without the runner's knowledge , so that the measurement would be normal.9

Reaction time measurement test (fallen ruler test):

The runner sits next to a table with his arm bent at a 90-degree angle at the elbow and placed on the table surface, pointing his thumb and forefinger upwards without touching the ruler.

The researcher holds a ruler (61 cm) vertically, so that the zero mark is at the highest point between the runner's thumb and forefinger. Without any prior warning.

The researcher releases the ruler, and the runner tries to catch it as quickly as possible.

- The value is read in centimeters at the point of contact.

Two consecutive attempts are made, the fastest one is used as the final score for the test.

Main Experiment :

• Pre - test :

The pre-test was conducted on (28/4/2026) which was Sunday at the athletics field of the College of Physical Education and Sports Sciences, where the researcher applied the tests to the members of the main research sample of (20) players by measuring the percentage of (number of breaths, heartbeats). The reaction time before the race was measured, and the results were collected and extracted in order to compare them with the post-test results to identify the effect of the psychological program on controlling and improving it.

Applying the psychological program :

1- The program was implemented collectively by a specialized psychological counselor conducting the sessions , and in the presence of the researcher. On one of the designated halls in the college , with (6) sessions, each lasting (40-60 minutes), starting from 1/5/2026, the date of the first session , and at a rate of one session per week.

2- The procedures for tracking the sessions were as follows :

- Checking the participants' reactions to the previous session.
- Reviewing homework (by asking about the assignment and thanking the individuals who completed the assignment well).
- Linking (the previous session is reviewed in order to link it with the new session)
- The work list (which includes the title of the new session and what will be covered, and will be in the form of a work list).
- Implementing the items on the work list (by explaining the new topic, its importance to them, and how to benefit from it and apply it in reality using psychological methods) .

- Homework (exercises and tasks for next week).
- Evaluation (summarizing what happened in the session, asking questions of the runners , identifying the positives and negatives in it).

3- In the closing session, a date was set for the post-test, under the same conditions.

• Post - test :

The post-test was conducted on (June 18 , 2026) for the experimental and control group members under the same conditions as the pre-test , by measuring (heart rate , number of breaths) and reaction time before the start of the race . The results were collected and extracted in order to compare them with the results of the pre-test, to know the effect of the psychological program in controlling and improving them .

Statistical methods :

The researcher used the Statistical Package for the Social Sciences (SPSS). The process is as follows:

- The arithmetic mean.
- Standard deviation.
- (Ka 2) test .
- (t) test for two independent samples .
- Simple correlation coefficient (Pearson 's).
- Torsion coefficient .

Results

• Presentation and Analysis Results of the control group in pre- and post-tests of heart rate, respiratory rate , and reaction time , in runners Activity (100m) :

Table (1). Between the arithmetic means, standard deviations, and the calculated value of (t) between the pre-test and post-test for the group control of respiratory rate, heart rate and reaction time in 100m event runners .

Statistical indicators variables	unit of measurement	Pre-test		Post-test		T	sig	Significance
		mean	Std.	mean	Std.			
Number of breaths	Number of times	18.21	3.64	18.12	3.47	0.28	0.786	Not significerial
heart rate	beats/min	76.38	6.25	75.49	6.25	0.42	0.684	Not significerial
reaction time	cm	18.45	2.30	18.10	2.25	0.31	0.764	Not significerial

Table (1) shows the arithmetic means, standard deviations, and calculated (t) value between the pre- and post-tests for the control group in heart rate, respiratory rate, and reaction time for runners. (100m) activity This indicates that there are no significant differences between the pre-test and post-test .

• Presentation and analysis of the results of the experimental group in the pre- and post-tests of heart rate, respiratory rate and reaction time in 100m sprinters :

Table (2). Between the arithmetic means, standard deviations, and calculated t -value between the pre- and post-tests of the experimental group in respiratory rate , heart rate , and reaction time , among runners (100m) activity

Statistical indicators variables	unit of measurement	Pre-test		Post-test		T	sig	Significance
		mean	Std.	mean	Std.			
Respiration count	**how often**	**18.12**	**3.47**	**15.32**	**3.80**	**5.69**	**0.000**	**Significant**
heart rate	**beats/min**	**75.49**	**6.25**	**72.53**	**6.82**	**6.12**	**0.000**	**Significant**
reaction time	cm	**18.60**	**2.40**	**13.20**	**1.95**	**6.85**	**0.000**	**Significant**

Between the arithmetic means, standard deviations, and calculated t -value between the pre- and post-tests of the experimental group in heart rate, respiratory rate, and reaction time My 100m runners This indicates that there are significant differences between the pre-test and the post-test, in favor of the post-test .

Discussion.

• Discussion of the results of the control group In pre- and post-tests of heart rate, respiratory rate , and reaction time , the runners Activity (100 m) :

Table (1) shows that the differences between the pre-test and post-test are not significant due to the control group's non-participation in the psychological program . This is expected in stressful situations and the accompanying psychological disturbances that affect runners' behavior , performance levels, and achievement.10 This is consistent with what Amer Saeed pointed out that " the excessive emotional states that the player is exposed to, such as fear and anger, lead to an increase in heart rate as well as an abnormal increase in the number of breaths to compensate for the lack of oxygen that is burned quickly in the reactions that occur inside the body as a result of the psychological and organic instability that the player is going through .11" Regarding reaction time, the results showed no There are significant differences between the two tests, and the researcher attributes this to the fact that the control group was not exposed to a program that reduces stress and improves concentration, given that reaction time is a neuromuscular ability that requires training and direct intervention to improve it .12

• Discussion of the experimental group's results in the pre- and post-tests of heart rate , respiratory rate , and reaction time:

By observing Table (2) , the results presented indicate that The study found statistically significant differences between the pre-test and post-test scores of the experimental group in the variables of heart rate, respiratory rate , and reaction time.13 The researcher attributes the improvement in these indicators to the group psychological program , which demonstrated an improvement in these variables. This improvement resulted from the participants receiving psychological support through their positive participation in the sessions.14 This finding aligns with the conclusions of Taha Abdel-Azim Hussein, who stated that " training individuals in relaxation reduces the symptoms of physiological arousal resulting from stress, decreases muscle tension, and lowers heart rate and respiratory rate.15" When the muscles relax, blood flows more easily, pressure on blood vessels decreases, the pulse slows down, energy is conserved, and stress and fatigue decrease.16"As for the reaction time variable, as shown in the table, the results showed statistically significant differences between the pre-test and post-test, in favor of the post-test.17 The researcher attributes this to the improvement brought about by the psychological program in reducing muscle tension, which made the runner's motor response faster, in addition to improving focus and attention, and thus it was reflected in the speed of reaction.18

Conclusions:

1- The program the proposed psychological approach has a positive effect on the development

of heart rate, respiratory rate , and reaction time in runners. (100m) activity.
2-Prove The psychological program has a positive impact on Providing runners with psychological techniques to control responses resulting from training and competition situations.
3- showed the importance of the group program in achieving the improvement observed in heart rate, respiratory rate , and reaction time among the runners in the experimental group, as it enabled The runners had the opportunity to express their emotions and share their experiences during the sessions, which enhanced their ability to control their psychological and physical responses, and this was reflected positively in the results obtained by the research.

Recommendations:

1- The need to pay attention to the psychological aspect and the problems that athletes face During the training and competition period , they help them to provide appropriate solutions , thus providing the best conditions to demonstrate the best athletic performance and achievement.
2- Introducing club coaches to training courses related to psychological programs ; because this aspect plays an effective role in preparing players psychologically , which is complementary to the other aspects that runners need .
3- Attention should be paid to functional and psychological tests to assess the psychological state of athletes before the match.

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