



Special Exercises Using the Blazepod Training Device and Their Effect on Motor Response Speed, Help and Recover Defense among Under-18 Basketball Players

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Abstract

The importance of this research depend on introducing a modern and interactive technological tool that improve the efficiency of the training process and offers immediate feedback to the player. This transition in training from the traditional model to one according to intelligent visual and kinetic stimulation thereby improving tactical decision-making. This interactive technology develops motor response speed by immersing the player in a game-like environment which in turn impacts complex defensive skills particularly the Help and Rotate/Recover skills. The research objectives to achieve this by developing specific exercises using the Blazepod training device and identifying the impact of these exercises on developing motor response speed and the performance level of the Help and Rotate/Recover defensive skills in basketball players under 18 years of age. The researchers used an experimental approach with a single experimental group design and two pre-tests. The sample was chosen purposively and consisted of (12) young players from the Dijlah Sports Club with a mean age of (17.14) years and a standard deviation of (± 1.855). The mean height was [missing information]. (180.135 cm) with a standard deviation of (± 3.215) and a mean body mass of (78.211 kg) with a standard deviation of (± 3.763). After pre-testing a two-month training program was implemented with the sample three days a week. Post-testing was then carried out and the researchers concluded that the specialized exercises developed by the researchers using the Blazepod training device were more effective than traditional coach-prepared exercises in developing motor response speed and defensive support and coverage skills among young basketball players. This is evident from the difference in the calculated means.

Keywords: Blazepod training device, motor response speed, support and defensive coverage.

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Introduction

The significance of this research lies in introducing modern and interactive technological tools, such as the Blazepod device into the local training environment. This technology develops the efficiency of the training process, raises the level of competitiveness, increases player motivation also provides immediate feedback This shifts training from a traditional approach to one based on intelligent visual and kinetic stimulation thereby improving tactical decision-making. As Diao (2025) explains "This interactive technology develops the speed of motor response which is important for most defensive skills as it immerses the player in a game-like environment thus optimizing complex defensive skills." Especially this implements to the "Help" and "Rotate/Recover" skills of basketball players under 18 years old the age group where the concepts of collective defense and tactical discipline are most improved.

The principal objective of using this modern training tool is to transform training from a traditional method depended on observation and experience to a scientific method based on measurement, analysis and data-driven decision-making.

The study goals to develop specific exercises using the Blazepod training device and to determine the effect of these exercises on improving motor response speed and performance levels. The skill of assisting and defensive coverage in basketball players under 18 years of age has been the subject of numerous studies including those by Mahdi (2023), Hamad (2023), Muhammad (2021), Al-Ta'i (2015), and Muhammad A. (2008) which have explored this aspect and connected to variables across different sample sizes. However, these studies have not addressed the specific problem this age group needs to solve.

Through observation and tracking of training sessions and matches for the under-18 category and drawing on their academic and technical expertise, the researchers observed a clear weakness or delay in the timing of defensive interventions (providing assistance to teammates) and quick defensive coverage when the ball is passed. This leads to wide gaps that opponents can easily exploit.

The researchers attribute this deficiency to the prevailing reliance on traditional training methods that absences the element of surprise and varied visual stimulation.

They note that assisting and defensive coverage movements are trained as predetermined predictable motion paths, thus depriving players of the ability to react spontaneously. "Swift and quick when faced with changing situations in actual matches" (Mohammed, 2026). From here the research problem crystallized in an attempt to solve this gap by introducing special exercises using the (Blazepod) device to find out the extent of the effect of this technology on improving the speed of motor response and the direct reflection of this on the accuracy and speed of executing the skills of assistance and defensive coverage among basketball players under (18) years of age.

Methodology

The researchers used the experimental method with a single experimental group design and pre- and post-tests as it was suitable for the research problem. The sample was chosen purposively and it included of (12) players from the Dijlah Sports Club young players under the age of 18, participating in the Iraqi League for the sports season (2025-2026) in order to provide the sample and make it easy to control and because the sample was committed to daily training in addition to the availability of the hall and equipment. The researchers performed homogeneity for the sample by extracting the skewness coefficient as shown in Table (1).

Table1. Shows the variables, unit of measurement, arithmetic means, median, standard deviation, and skewness coefficient for homogeneity of the research sample.

variables	unit of measurement	arithmetic means	standard deviation	skewness coefficient
Age	Year	17.14	1.855	0.903
Training age	Year	5.813	1.472	0.825
Mass	Kg	78.211	3.763	0.781
Hight	Cm	180.135	3.215	0.773

The sample is considered homogeneous if the skewness coefficient does not exceed (± 1).

Research Equipment and Tools:

A regulation basketball court, (12) regulation basketballs, (2) timers, (1) HP laptop, (2) Fox whistles, (20) meters of fabric measuring tape, (4) colored tape strips, (12) colored cones, (12) markers Harith's system for measuring motor response speed with visual stimuli and the Blazepod training device as shown in Figure (1).



Figure1. Shows the (Blazepod) training device

Tests:

1. Harith Test for Measuring Motor Response Time (Mohammed H., 2021, p. 56):

- ❖ **Test Objective:** To measure motor response speed.
- ❖ **Required Equipment:** Harith Motor Response Time Measurement Device and an obstacle-free area of at least (4 x 4) meters.
- ❖ **Device Description:** The device included of four illuminated poles, each (1) meter high. A light sensor is located at the top of each pole. The sensor calculates the time of each attempt when the player touches the pole. The poles are connected by electrical wires to a control unit, which is a plastic box measuring (30 x 20) centimeter. This box contains electronic circuits that calculate the motor response time and display it on an electronic screen (10 x 3) centimeter mounted on the box's surface. The screen displays the time of the eight motor response attempts.
- ❖ **Test Procedure and Recording:**
 - The device begins by illuminating the four markers as a readiness signal for the player being tested. Then all the marker lights turn off concurrently.
 - When the subject stands on the starting line the device automatically detects their presence using an infrared sensor. From this point one of the light markers is randomly activated and a timer begins to run.
 - The subject then starts running at maximum speed to touch the sensor above the marker to turn off the light. The device displays the time of the seek to which represents the time between the light turning on and off—that is from the moment the subject stands on the starting line and the marker lights up until the moment the sensor above the marker is touched.
 - **The subject performs eight (8) attempts.**
 - **The motor response time for each subject is calculated by collected the eight attempts.**

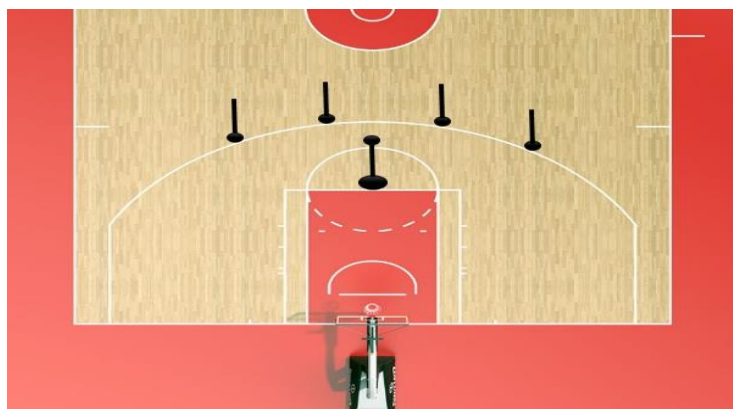


Figure2. Shows the Harith Test for Measuring Motor Response Time

2. Assistance and Cover Test (Hussein, 2012, p. 108):

- ❖ Test Objective: To measure the speed of assisting and covering basketball players.
- ❖ Equipment Used: Adhesive tape, leather measuring tape (20m), four markers, electronic timer, whistle and scoring paper and pens.
- ❖ Test Procedure: Five markers are distributed as follows: Mark 1 is the basket on the floor and Marks 3 and 5 are to the right and left of Mark 1, each 5m away. Marks 2 and 4 are along the free-throw line, facing Marks 3 and 5, as shown in Figure 3.

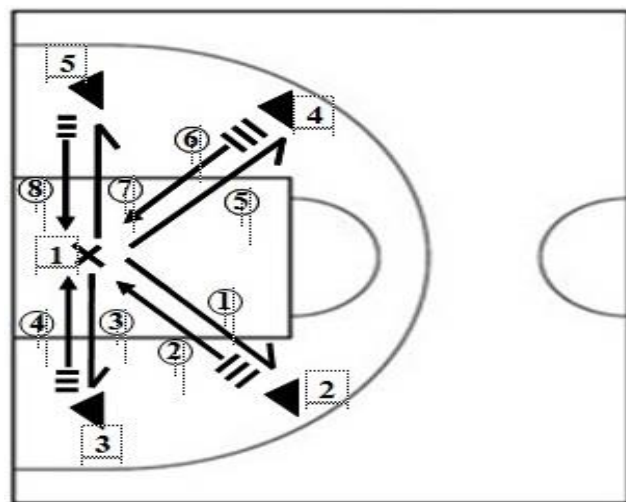


Figure3. Shows the defensive assistance and coverage test

❖ Performance description:

The defending player stands on the first marker, and upon hearing the starting signal via the whistle, the player performs the defending player's movement towards the second marker (marker 1) and touches the marker with the right arm then runs back to the first marker then performs the defending player's movement towards the third marker (marker 2) and touches the marker with the right arm and returns to the first marker then does the same procedure from the other side as shown in the figure in eight steps.

❖ Test requirements:

- Perform the test steps quickly.
- Bend your knees when performing the defensive player's movement while raising your arms at least 90 degrees between the upper arm and the torso.
- Only one attempt.

❖ Test management:

- Timer: Gives a start and end signal via a whistle with a timer.
- Recorder: Calls out names and notes performance while recording the test time.



❖ Scoring: The time taken by the player to perform the test with its eight steps is recorded according on the start and end whistles.

Exploratory experiment:

The researchers carried out a preliminary study to confirm several points and information that are necessary when conducting the main research experiment. Therefore the researcher conducted his exploratory experiment on (5) players from Al-Adhamiya Club in the indoor hall of Al-Adhamiya Sports Club on Saturday, 07/02/2026 at four o'clock in the afternoon. The researcher objectives from this experiment to reach the following:

Make sure about the safety and validity of the tools used in carrying out the tests.

Knowing how long each test takes.

Knowing how well the team understands the details of the tests and how to implement them as well as how to record the test findings.

_ Ensuring the suitability of the tests for the sample level and the extent of their understanding and response to them.

Field research procedures:

Pre-tests:

The researchers conducted the pre-tests for the research sample in the indoor hall of the Tigris Sports Club on Thursday, February 12, 2026 at 4:00 PM.

Exercises used in the research:

The researchers improved special exercises on the (Blazepod) device to enhance the speed of motor response, assistance and defensive coverage with basketball for the research sample. The researchers took into account all the scientific foundations and principles during this phase as follows:

- The training period lasted eight weeks.
- Total number of training units (24 training units).
- Number of weekly training units (3 training units).
- Weekly training days (Saturday, Monday, Wednesday).
- The duration of the special exercises in one training unit is (35-60) minutes within the main section.
- The high-intensity interval training method was used.
- The intensity used for the exercises (75-100%).
- The intensity was determined based on the pulse.
- The wave load was 1:3 (three weeks of increased intensity and one week of decreased intensity for the purpose of adaptation).
- The exercises were started on Saturday, 14/02/2026.
- The exercises were completed on Thursday, 08/04/2026.

Post-tests:

The researchers conducted the post-tests for the research sample in the indoor hall of the Tigris Sports Club on Saturday, April 11, 2026, at 4:00 PM, in the identical manner and under the same conditions as the pre-test conducted by the researcher.

Statistical methods:

The statistical package (SPSS) was used which is:

Percentage, median, arithmetic mean, standard deviation, skewness coefficient, simple correlation coefficient (Pearson's) t-law for correlated samples.

Results:

Presentation and discussion of the research test result for the experimental group between the pre-test and post-test:

Table2. Shows the arithmetic means and standard deviations for the experimental group between the pre-test and post-test in motor response speed and the assistance and defensive cover test

Test	unit of measurement	post-test		pre-test	
		M	Sd	M	Sd
Harith Motor Response Speed Test	Second	13.403	1.542	11.501	0.758
Assistance and Defensive Cover Test	Second	17.307	2.331	14.238	0.973

Table3. Shows the difference in arithmetic means, standard deviation, calculated t-value, and significance of the differences between the results of the pre-test and post-test in motor response speed and the assistance and cover test for the experimental group.

Test	unit of measurement	D	E s d	calculated t-value	Error level	Significance
Harith Motor Response Speed Test	Second	1.902	0.155	12.270	0.000	Significant
Assistance and Defensive Cover Test	Second	3.069	0.317	9.681	0.000	Significant

* DF (12-1=11). Significant at the significance level of (0.05) if the error level is less than (0.05).

Discussion:

Tables (2 and 3) show significant differences between the pre-test and post-test in motor response speed and the defensive assistance and coverage test favoring the post-test.

The researchers feature this to the effectiveness of their designed exercises which were according to sound and standardized scientific principles regarding intensity volume and rest. These exercises conducted over two months, effectively and significantly improved motor response speed using the Blazepod device. Motor response is connected to reaction time and the player's movement time in defensive maneuvers—the time needed to finish a movement, encompassing anticipation, reaction and movement times (W, 1990, p. 202).



This is vital for basketball players in most individual and team defensive skills which are tailored to the nature of the situations basketball players face from the opposing team's offensive play to their rapid response to changes in the offensive situation (Sabbah, 2020).

The researchers increased the obstacles of the exercises as the training sessions progressed by adding more units. The player must perform the greatest number of motor responses without being aware where the light is working so that he is fully prepared to defend assist and cover during the match for the opponent's offensive situations.

This is what demand the player during the exercises to increase the speed of performance by developing the speed of response. "Training at different speeds contributes to developing the speed of response" (Alawi, 1998, page 170).

The researchers took into account when giving motor response speed exercises that they should be at the beginning of the training session because the nervous and muscular system is at rest and therefore the exercises are more effective. "The motor response to stimuli is complete when the nervous and muscular system is at rest and it is not permissible to tire it before training on fast movements" (Nassif, 1980, page 58).

As for the results of the defensive assistance and coverage test the researchers attribute this development to the effectiveness of the defensive exercises they prepared on the machine which were chosen in a manner similar to the offensive play situations of the opposing teams. This is in addition to the development of the speed of motor response and the connect between it and the movements of the defending player and the diverse play situations in terms of assistance, coverage and stopping shooting from various areas.

The speed of the defensive player's motor performance which is represented by the speed of motor response and transition is an significance element in basketball as it is related to the result and time of performance and indicates the player's ability to perform a specific movement or set of movements in the shortest possible time.

This verifies from the strong relationship and great correlation between the speed of motor response and defense based on the change in the positions of the player and the attacking team and the speed of the defender's response to this change to reach the best performance and result. Moreover "the variety of exercises and their progression from easy to difficult in terms of the choose intensity and the method of increasing this intensity and its appropriate sizes as well as the suitable rest given to the players whether after each repetition or between sets all of this brought about the development in defensive skills" (Mohammed H., 2026).

Particular drills are the coach's means of implementing and mastering defensive skills. This demands the coach to "create and develop diverse drill combinations that incorporate elements of excitement and suspense besides to physical conditioning to avoid boredom among the players" (Majed, 2026). This necessitates a gradual progression from easy to difficult drills modifying repetitions, intensity, and rest periods based on individual differences. Furthermore it requires "the player to perform these skills with mastery and completeness executing them correctly under any match conditions" (Hassan, 2000, p. 25).

The selection of drills should be based on the movement patterns of the skills (focusing on the working muscles) and the drills should be varied and similar to different game situations. All of this gives the player chance to confront the changing game situations that occur in competition.



This is what the researcher reached through his drills using the Blazepod device which provides different signals to the player to perform variety defensive movements contingent on the type and location of lighting to adapt to the changing nature of the game.

The goal of training in basic defensive skills is to The diversity of its options and positions “that the success of the player’s skill performance depends on the degree of mastery of motor skills, no matter how the circumstances change which leads to the player reaching a high degree of performance mechanism and effectiveness so that the inevitable result is the execution of the desired goal (Muhammad Kh., 2000, page 37) in addition to the quality of exercises prepared by the researchers worked to develop all the muscles working on skill performance through continuous repetition of defensive skills in terms of leg movement assistance, coverage and stopping shooting from different areas, and this requires continuous movement and alertness from the player and thus improves response speed, the physical aspect and coordination between vision and foot movements” that “the exercises inevitably lead to an improvement in neuromuscular coordination and the adequacy of the working muscles in developing their performance capabilities” (Al-Harhour, 1993, page 101).

Conclusions:

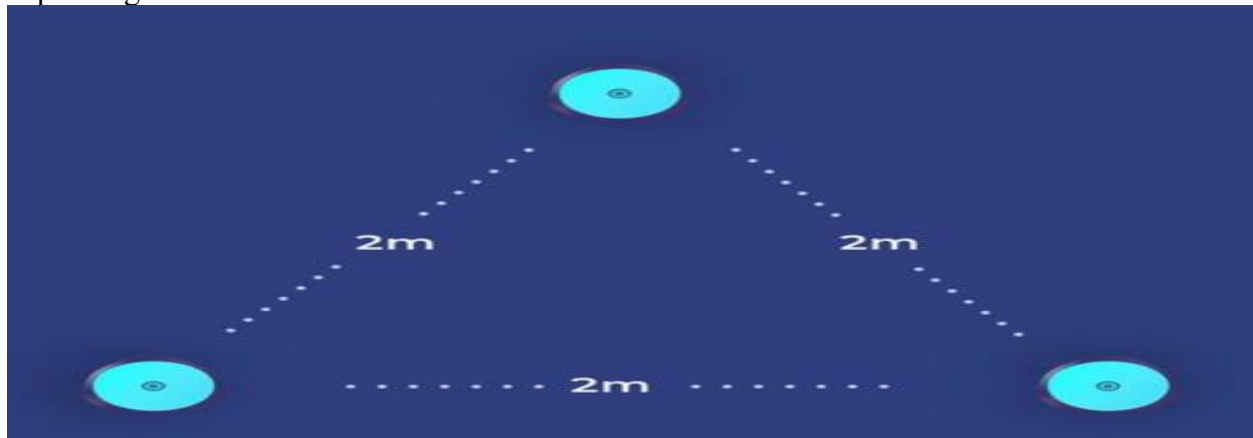
- The researchers' specially designed exercises using the BlazeRod training device were more effective than traditional exercises prepared by the coach in improving motor reaction speed in young basketball players as evidenced by the difference in the calculated averages.
- The researchers' specially designed exercises using the Bazeod training device were more effective than traditional exercises prepared by the coach in developing assisting and defensive covering skills in young basketball players as evidenced by the distinction in the calculated averages.
- The researchers' specially designed exercises using the BazeDod training device were more effective than traditional exercises prepared by the coach in developing neuromuscular coordination in young basketball players as evidenced by the difference in the calculated averages throughout the period.

Appendixes:

Appendix (1)

Exercises used in the study

Ex 1 One player performs the exercise, and 3 pods are located in a triangle with a distance of (2m) between them. The player performs the exercise by performing a side-sliding movement and turning off the light emitted from the pod without knowing which pod will light up depending on the time allotted for the exercise

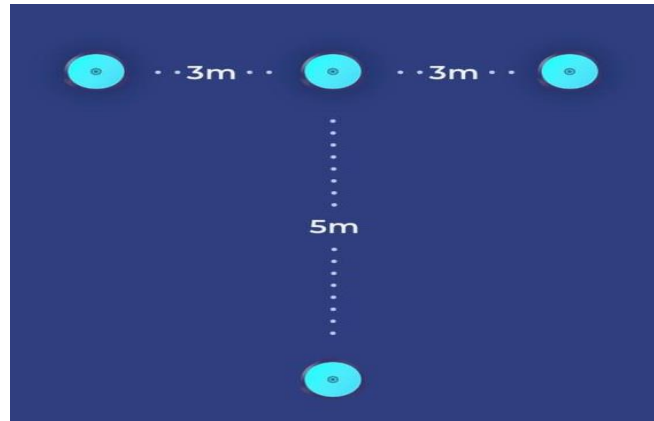


Exercises (2) One player performs the exercise and 4 pods are placed in a square with a distance between them (4m). The player performs the exercise by running to the sides continuously as in assisting and covering in defense and turning off the light emitted from the pod without knowing which pod will light up according to the time allotted for the exercise.

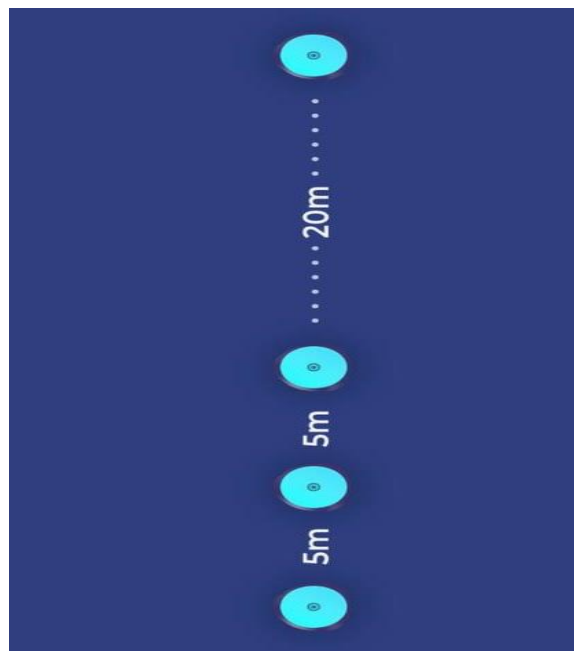


Exercises (3) One player performs the exercise. Four pods are placed in a T-shape with a distance of 3 meters between the side pods and (km) between the front pods. The player performs the exercise by continuously sliding sideways and running forwards and backwards, assisting and

covering in defense and turning off the light emitted from the pod without knowing which pod will light up all within the allotted time for the exercise

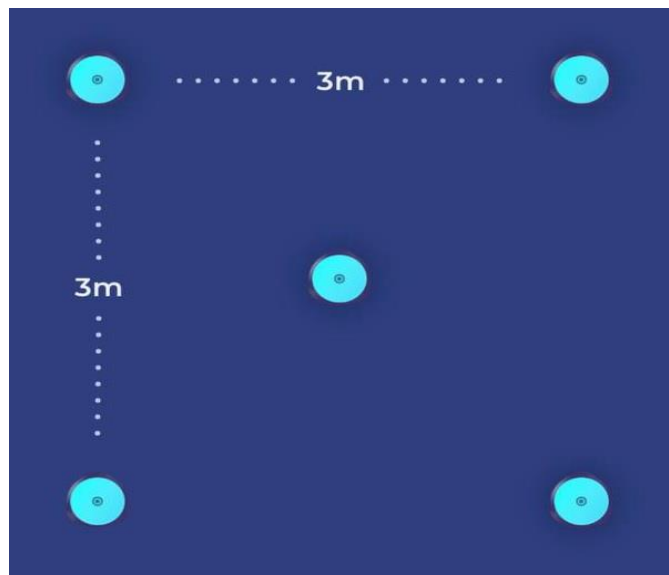


Exercises (4) One player performs the exercise, and 4 pods are placed in a straight line. The distance between the first and second pods is 4 meters, and between the third and fourth pods is 20 meters. The player performs the exercise by running forwards and backwards continuously, assisting and covering in defense and turning off the light emitted from the pod, without knowing which pod will light up and only during the allotted time for the exercise.



Exercises (5) One player performs the exercise. Four pods are placed in a square with one pod in the center.

The distance between them is 3 meters. The player performs the exercise by sliding sideways and running forwards and backwards continuously as in the example of assisting and covering in defense and turning off the light emitted from the pod without knowing which pod will light up according to the time allotted for the exercise.



It illustrates the exercises used in the training units

Week and Month: First and Second – Number training units.(6•5•4•3•2•1) :
First.

*** Exercise Duration: 40 Minutes**

Location: Dijlah Sports Club Indoor Hall

Section	Specified time	Exercise number	Exercise Duration	Sets	Intensity	Rest interval between sets	Rest interval between Exercises	Total performance time
Primary	40m	1	28s	4	%75	2_1m	3_2m	8m
		2	28s	4				8m
		3	28s	4				8m
		4	28s	4				8m
		5	28s	4				8m



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