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The Effect of Integrating Mental and Skill Training on Enhancing Skill Performance under Competitive Pressure in U18 Basketball Players

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Abstract

This study sought to examine whether the combination of mental and skill training enhanced performance stability under competitive pressure in u-18 basketball players. The experimental research was conducted pretesting and post testing with a two-equivalent groups design. The sample for the current study was comprised of 12 subjects, who were randomly divided into two groups of six. Integrated mental and skill training A combined nine-weeks of mental and skills training program (3 times per week) was given to experimental group, however normal training programmed were allotted to the control one. The basketball-specific skill tests and a competitive golf anxiety scale were administered to obtain the data that was analyzed using Statistical Package for the Social Sciences (SPSS). Findings identified variables with significant differences in terms of the experimental group performance, such as an increase on shooting accuracy and dribbling speed and passing accuracy and composite skill performance increased for the experimental group, while competitive pressure significantly decreased when compared to control. Results suggest that the methodical inclusion of mental and skill training is an effective way to improve athletic performance and increase skill performance consistency under competition pressure in young basketball players. Therefore, the study suggests introducing

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organized mental programs within daily training loads of these sports clubs and basketball academies.

Keywords: mental training, skill training, performance stability, competitive pressure, basketball.

Introduction

Basketball is a team sport with high physical, technical and psychological requirements resulting from the dynamic interplay of physical traits, motor abilities and mental preparedness necessary for successful performance. Newer literature indicates that sports performance does not only rely on physical and skill training but is also highly determined by psychological factors such as concentration, mental visualization, anxiety control, and coping with competitive pressure (Demir et al., 2025). Mental exercise is one of the key elements in modern sport psychology and may contribute to attention control, self-efficacy promotion as well as regulating emotional response during competition and consequently achieving a higher performance quality and better maintenance of performance quality un competitive situations (Zhang et al., 2025). Several studies have also proved that mental imagery-based instruction can help athletes to better simulate game situations and increase the speed and accuracy of decision-making (Aziz et al., 2024).

In this regard, research reveals that combining both mental and skill training stands as an effective approach to enhance the performance of an athlete in general, even when considering young players who tend to be more sensitive at a psychological level to competitive pressure (Abdulkareem & Hassan 2025). Li et al. (2025) proved that multicomponent cognitive-motor training achieves greater efficient performance and psychological reliability in execution. Stability of skill performance under competitive load is a significant criterion of success in formal competitions, since athletes often report decreases in technical performance under anxious and stressful conditions, and also negative emotions disrupt shooting accuracy, response time, and kinematics coordination when discharging weapons (Hannibalsson 2025). Thus, it has become necessary to promote training and training protocols aimed at improving the psychological hardware alongside its technical counterpart in young athletes.

Young basketball players are exposed to high psychological demands of performing under pressure, both in terms of coaches' and spectators' expectations and official competition demands. Recent studies show that when placed under this kind of pressures the skill accuracy and performance stability are negatively affected during competition (Hannibalsson, 2025). A number of studies have reported that mental reprogramming training (e.g., guided imagery and ACT) could be beneficial in decreasing competitive anxiety and enhancing player's self-efficacy, which promote the technical performance of the players as a whole (Aziz et al., 2024; Roodsarabi et al., 2021). Instead the usual exercise of skill learning without experience will rely solely on physical or technical variables, lacking an explicit focus on the psychological dimension as well as instruction and practice of performance elements, ultimately risking a decouple between training performances (and "performances" during competition) for which the athlete was prepared and will perform. Abdulkareem and Hassan (2025) indicated that the mental training programs, along with technical training, can lead to significant changes in shooting precision and motor consistency

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in young basketball players. More recent studies have also shown that the combination of cognitive and motor training enhances players' performance under competitive pressure and in stabilizing performance during a decisive situation (Li et al., 2025; Zhang et al., 2025). Therefore, there seems to be a need for scientific research into the impact of systematic implementation of mental and technical training on enhancing the stability of skill performance in competitive pressure situations among under-18 basketball players.

Significance The contribution of this study is that it emphasizes the amalgamated effect of psychological and technical training on athletic performance, offers a scientific reference for coaches to design systematic trainings, promotes the formation of modern methods for the youth training system, and strengthens athletes' ability to withstand competitive pressures.

Through practical on-site verification and official matches' technical observation, it was discovered that dozens of under-18 players' competition performance in terms of skills is fluctuant, even though they played well at the training courses. The competing is due to competitive stress and psychological anxiety, etc., and no integrating training plan to do the mental work together with skill practice. Therefore, the problem of research is expressed in the question:

Does integrating mental training with skill training improve the stability of skill performance under competitive pressure among under-18 basketball players?

Research Objectives

1. To identify the effect of integrating mental training with skill training on improving skill performance stability.
2. To examine the impact of the proposed training program on reducing the level of competitive anxiety.
3. To compare the level of skill performance under competitive pressure before and after the implementation of the program.
4. To determine the effectiveness of mental training as part of comprehensive training programs.

Research Hypotheses

1. There are statistically significant differences between the pre- and post-tests in favor of the experimental group in skill performance stability.
2. There are no statistically significant differences between the pre- and post-tests in favor of the experimental group in skill performance stability.
3. There are statistically significant differences between the experimental and control groups in skill performance under competitive pressure.
4. There are statistically significant differences between the experimental and control groups in skill performance under competitive pressure.

Research Scope

1. Human domain: The First Al-Karkh Directorate of Education under-18 basketball team.
2. Time domain: From 10/11/2024 to 28/2/2025.

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3. Spatial domain: The Sports and Scout Activity Department in the First Al-Karkh Directorate.

Methodology

Study Design

The experimental method was utilized by the researcher in applying two similar groups (experimental and control) through using pre-and-posttest, since it is suitable to the type and goals of study in revealing to what extent mental training integrated with skill training has on enhancing the stability of performing skills under pressure situation among U-18 basketball players.

Population and Sample
Population Study

The research population consisted of under-18 players of the First Al-Karkh Directorate of Education basketball team in Baghdad for the 2024–2025 season. The training sessions were conducted at the Sports and Scout Activity Department in Al-Karkh First, Baghdad.

Sample Study

Sampled players from the students of First Al-Karkh Directorate of Education basketball team were purposively chosen in Baghdad. The population under consideration is a sample of 12 players, with age ranging from 16 to 18 years divided randomly in two groups: experimental group (6 players) and the control group (6 players). The criteria included frequent attendance at practice, homogeneity in skill level, no injuries during the time of the research and consent to participate in the training.

The equivalence of the experimental and control groups in all research variables was verified using the independent samples t-test. The results showed no statistically significant differences between the two groups in the pre-test measurements, indicating their equivalence, as presented in Table (1).

Table 1. *Equivalence of the experimental and control groups in the research variables (pre-test measurements)*

Variables	Group	N	Mean	SD	t-value	Sig.	Statistical significance
Shooting accuracy (score)	Experimental	6	4.87	1.13	0.58	0.566	Not significant
	Control	6	4.67	1.09			
Dribbling speed (sec)	Experimental	6	12.81	0.74	0.63	0.532	Not significant
	Control	6	12.93	0.78			
Passing accuracy (score)	Experimental	6	6.27	1.02	0.51	0.612	Not significant
	Control	6	6.13	0.98			
	Experimental	6	5.93	1.11	0.49	0.628	Not significant

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Combined performance under pressure (score)	Control	6	5.80	1.07

Tools and Equipment Used

- Official basketball court
- Official basketballs
- Stopwatch
- Measuring tape
- Markers
- Training cones
- Data recording forms
- Video camera (when needed for documentation and analysis)

Tests Used

1. Jump Shot Accuracy Test (Arias et al., 2012)

This test is a measure of the ability to successfully execute a jump shot under game-like conditions. Ten bounce shots maintained if he receives from a teammate or is on one bounce behind the free-throw lane, respectively. Ready: The player starts in the stance of ready, catches the ball or makes one dribble and shoots right away. This is done as many times as 10 in a row. Scoring is achieved by making 10 baskets before the time runs out; the total score is distributed upon how many of the ten baskets are made.

2. Dribbling Speed with Change of Direction Test (Sporiš et al., 2010)

The purpose of this test is to measure the ability to move, agility, and dexterity while dribbling with changes in direction. The article used a 20-meter-long zigzagging course set up with training cones, and the player had to dribble as fast as they could around it, changing directions until they reached the end. With the player standing behind the start line, the player takes off on a signal and dribbles his way in and out through the cones. The act finishes only when the player passes the finish line. Both of the performances are evaluated in seconds with a stopwatch, and the best result of 2 trials is counted as the last score.

3. Passing Accuracy Test toward Specific Targets (Pojskić et al., 2011)

This test examines the accuracy of passing and speed in making motor decisions of basketball players. In this test, three square targets are marked on the wall at varying heights, and the subject stands 5 m away from it. The player thereupon follows with ten continuous shots towards the targets in a devised pattern. Chest and bounce passes are being performed by the player in accordance with the set target order during play. One point is scored for each direct hit within the target area, and the end score is equivalent to the total of hits gotten through.

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4. Combined Performance under Time Pressure Test (Gabbett et al., 2009)

The purpose of this test is to assess the stability of performance in a complex skill under time stress approximating competitive pressure. It consists of a series of integrated tasks— namely dribbling, passing and shooting—that must be executed in a predetermined time interval (between 30" to 45") competed with temporal-spatial restrictions. That player begins by dribbling to a predetermined area on the floor and passes the ball to an intended target as they rush right into their jump shot. The pattern is constantly cycled until the time runs out. The score is the number of correctly executed skill sequences within the time limit, minus deductions for technical performance.

Competitive Pressure Scale

The Competitive Anxiety and Pressure Scale for Athletes, designed by Cox et al. (2003), was adopted from Martens et al. (1990) and modified to the Iraqi context and to fit the study population sample. The measure assessed the degree of performance-related psychological pressure in competition among under-18 basketball players. It assesses three primary dimensions of psychological states: cognitive anxiety, depicting worry and negative thoughts about competition; somatic anxiety, which includes symptoms and physical indicators of an anxious state such as muscle tension and enhanced heart rate; and self-confidence, displaying the player's judgment of their own ability levels in competitive circumstances.

The scale consists of 27 items in those three factors, which are answered using a 5-point Likert scale, whose possible responses range from (1 = never applies to me) to (5 = always applies to me). The content validity of the scale was tested through a panel of experts in sport psychology and measurement and evaluation; it revealed that the Cronbach's alpha coefficient reached (0.88), referring to a high level for reliability and consistency.

Table 2. *Modified Competitive Anxiety and Pressure Scale*

Item No.	Psychological Dimension	Item
1		I feel worried about not performing well in competition.
2		I experience negative thoughts about my level during the match.
3		I find it difficult to concentrate in competitive situations.
4		I am afraid of making mistakes during play.
5	Cognitive anxiety	I feel mentally tense before the match begins.
6		I think a lot about the match result before playing.
7		I feel confused when facing a strong opponent.
8		I feel anxious when performing important skills.
9		I feel a decrease in confidence when thinking about competition.
10		I feel tension in my body muscles before and during the match.
11		My heart rate increases at the start of play.
12		I feel difficulty breathing during competition.
13	Somatic anxiety	I experience excessive sweating during the match.
14		I feel trembling or shaking in my limbs during play.
15		I feel physically fatigued before the match ends.
16		I feel heaviness in movement during competitive performance.

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17		I feel muscle stiffness when performing skills.
18		I experience clear physical tension during competition.
19		I trust my ability to deliver an outstanding performance in the match.
20		I feel psychologically prepared for competition.
21		I have high confidence in my technical skills.
22		I feel calm and stable during play.
23	Self-confidence	I believe I can cope with competitive pressure.
24		I feel that I control the course of play.
25		I am confident in my ability to achieve victory.
26		I perform consistently even in difficult situations.
27		I maintain a positive spirit during competition.

Pilot Study

A pilot study with three players not included in the main research sample was carried out on 15/11/2024, to confirm the adequacy of the instruments applied, test clarity of instructions given, verify how long activities would take to implement and understand any difficulties that might occur during their implementation. Some implementation processes were refined to improve reliability and objectivity as a result of the pilot study findings.

Training Program

A specific adjusted training program was conceived to increase skill performance stability under competitive pressure. The mental part of the program was composed of a modern psychological technique, which included guided imagery targeting correct motor performance and competitive game situation visualization; breathing control activities that assist in controlling physiological responses and reducing anxiety and tension levels after performing; progressive muscle relaxation to decrease muscular tension with an aim for psychological well-being; attention-focus training helping players to want to be able to focus on relevant stimuli related to the football match and ignore distractions from the environment; and cognitive restructuring aiming at modifying negative thoughts connected with performance into more positive thoughts supporting self-confidence.

The skill component comprised shooting drills in different positions and distances; dribbling activities that require changes of direction and speed; and accurate passing routines under dynamic conditions, where the experimental group attempted to execute "decisions," subjecting players to competitive pressure by using performance time limits on drill stations as well as spatial and numerical constraints (small-sided activities). Small-sided training games were organized with the aim of exposing players to similar game conditions that they might encounter in official competitions, helping them to achieve greater efficiency of their skills during matches.

The training program was developed based on contemporary scientific knowledge in relation to the characteristics of the under-18 basketball age group and targeted the systematic integration of mental training and skill improvement for increasing skill performance stability when playing in competition. The intervention program lasted for 9 weeks and consisted of three

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training sessions a week (27 training units). For profiling on-court training, seventeen sessions of 90 min duration were held; for mental, 20–25 min were used (guided imagery training, breathing control, progressive muscle relaxation, attention focus, and cognitive restructuring), followed by skill sessions: 60–70 min allocated to technical actions (shooting, dribbling, and passing) or game situations resembling competitive pressure and SSG, concluding with a 5–10 min warm-up/cool-down. The method also took into account the law of gradual training load increase, harmony between psychological aspects and skill elements, and step-by-step movement from simple exercises to forms more similar to competition, as shown in Table (3).

Table 3. *Weekly training units program during the intervention period (9 weeks)*

Week	No. of Units	Mental Training Goal	Mental Training Content	Skill Training Goal	Skill Training Content
1		Psychological preparation	Relaxation + breathing control	Skill foundation	Basic drills for shooting, dribbling, and passing
2		Improving concentration	Simple imagery + attention focus	Developing basic skills	Dynamic shooting drills + zigzag dribbling
3		Confidence enhancement	Guided imagery + cognitive restructuring	Skill integration	Combined drills (dribbling + passing + shooting)
4	3	Anxiety control	Deep breathing + progressive relaxation	Skill accuracy	Shooting under time constraints + fast passing
5		Emotional stability	Imagery of competitive situations	Performance under pressure	Skill drills with time limits
6		Psychological readiness	Match imagery + attention focus	Speed of performance	Fast dribbling + accurate passing
7		Confidence in confrontation	Opponent imagery + cognitive restructuring	Competitive play	Small-sided training matches
8		Competition simulation	Full competition imagery	Combined performance	Game situations simulating pressure
9		Consolidation and stability	Comprehensive review + relaxation	Performance stabilization	Full matches + skill evaluation

Meanwhile, the control group followed the traditional training program adopted by the coach without the use of any structured mental training exercises.

Procedures

The study was carried out as per a clear-cut systematic methodological plan befitting the experimental design and purpose of the investigation. The implementation strategies were a series of ordered sets that were initiated by pre-tests completed with the analysis of the statistical data. The pretests were conducted on the experimental and control groups 3/12/2024 to estimate the baseline of research variables: stability strength performance under competitive pressure,

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shooting accuracy, speed drill-dribbling, passing skills accuracy, and competitive pressure level. These measurements were performed for both groups under standard conditions: the same time, place, instruments, and instructions were used to obtain objective and precise results.

Upon completion of the pre-tests, the experimental group received the proposed training program from 6/12/2024 to 10/2/2025 at three training sessions per week for nine weeks. A mental skill training program with an integrated approach was included in the training of the experimental group, and a control group continued to train by conducting conventional unsystematic play selected by the coach (traditional practice) without any formal psychological treatment. Throughout this period, the researcher is constantly monitoring training operations, controlling the intensity of the training load, reviewing players' compliance with components of the program, and providing favorable psychological and physical conditions for appropriate implementation.

Following the treatment application, post-tests were carried 11/2/2025 using the same tools and tests that were used during pre-testing under homogeneous place, time, performance procedures, and recording methods requirements to compare results as well as to measure how much each of the research variables had been affected by the training program application.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) was used to analyze the data through the following statistical procedures:

- Arithmetic mean
- Standard deviation
- Skewness coefficient
- Paired-samples t-test
- Independent-samples t-test

Results

Table 4. *Results of the pre- and post-tests for the experimental group*

Variables	Measurement	Mean	SD	t-value	Sig.	Significance
Shooting accuracy	Pre-test	4.87	1.13	8.94	0.000	Significant
	Post-test	7.93	0.88			
Dribbling speed	Pre-test	12.81	0.74	7.88	0.000	Significant
	Post-test	10.94	0.63			
Passing accuracy	Pre-test	6.27	1.02	8.31	0.000	Significant
	Post-test	9.13	0.84			
Combined performance	Pre-test	5.93	1.11	9.02	0.000	Significant
	Post-test	8.87	0.91			
Competitive pressure	Pre-test	78.47	6.81	10.16	0.000	Significant

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	Post-test	61.33	5.92			

Table 5. *Results of the pre- and post-tests for the control group*

Variables	Measurement	Mean	SD	t-value	Sig.	Significance
Shooting accuracy	Pre-test	4.67	1.09	2.11	0.052	Not significant
	Post-test	5.47	1.02			
Dribbling speed	Pre-test	12.93	0.78	1.88	0.071	Not significant
	Post-test	12.31	0.71			
Passing accuracy	Pre-test	6.13	0.98	2.24	0.041	Significant
	Post-test	6.93	0.96			
Combined performance	Pre-test	5.80	1.07	2.36	0.034	Significant
	Post-test	6.27	1.01			
Competitive pressure	Pre-test	79.13	7.02	1.95	0.064	Not significant
	Post-test	75.20	6.74			

Table 6. *Independent-samples t-test results for post-tests between the two groups*

Variables	Group	Mean	SD	t-value	Sig.	Significance
Shooting accuracy	Experimental	7.93	0.88	6.12	0.000	Significant
	Control	5.47	1.02			
Dribbling speed	Experimental	10.94	0.63	5.47	0.000	Significant
	Control	12.31	0.71			
Passing accuracy	Experimental	9.13	0.84	6.33	0.000	Significant
	Control	6.93	0.96			
Combined performance	Experimental	8.87	0.91	6.74	0.000	Significant
	Control	6.27	1.01			
Competitive pressure	Experimental	61.33	5.92	6.89	0.000	Significant
	Control	75.20	6.74			

Discussion

The purpose of this study was to test the effect of adding mental training to skill-oriented training to improve the stability of on-task performance under competitive pressure with an under-18 basketball population. The results indicated that the designed program had a significant effect on all skill and psychological variables in the experimental group as compared to the control group, who were trained under a traditional training program.

This gain is supposed to be because of the systematic combination between psychological and skill elements in the course of training. This is in line with the current literature on mental training playing a key role for psychological preparedness and anxiety/tension regulation during competition and, as such, improving the quality/performance stability (Weinberg & Gould, 2019). Moran (2016) also adds the fact that relaxation and mental imagery techniques can assist athletes to improve concentration and attention and reduce mental distortion in competition.

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The better performance of the mental treatment group in task variables is strong evidence of the benefits of mental practice for optimizing motor control and coordination neuromuscular mechanisms. Slimani et al. 's results communicate that mental image functions to moderate technical performance by providing activation of neural structures for calls on the execution of motor task which can cause improved point and smoothness movement. Guillot and Collet (2010) have also write about that the combination of physical training with mental training is ingoing to be more impactant for an athlete performance than just a type of kinesthetic practice only.

With respect to the lowered competitive anxiety of the experimental group, its reduction is as a result of prog ram's concentration on progressive muscle relaxation, deep breathing and cognitive restructuring which are appropriate strategies in controlling emotional arousal and reducing competitive stress. Relatedly, Hanton et al., 2005) reported that psychological interventions can be designed to change anxiety from a debilitative effect into an enhancive one in enhancing performance). Anxiety/emotion regulation is a necessary skill if athletes are going to be able to remain stable in performance and make decisions under competitive conditions (Jones et al., 2018).

In contrast, the definite progress in the control group demonstrates flaws in current training programs, which tend to concentrate primarily on physical and skill aspects disregarding psychological components in part. Accordingly, performance is still prone to oscillate under competitive conditions. Fletcher and Sarkar (2016) suggested that the lack of a formalized pre-performance psychological routine leaves athletes exposed to performance collapse in high-pressure situations, particularly amongst youth populations.

Indeed, these current results are in line with those reported by Birrer and Morgan (2010) who found that randomized control trials on structured mental training against a waiting list have demonstrated higher confidence, lower anxiety, and increased levels of attentional control for certain aspects in sport performance. They are also in agreement with the results of Thelwell et al. (2017), they demonstrated that combined psychological intervention obviously enhances technical and psycho-stability on team sport players.

Therefore, it is reasonable to believe that systematic combination of mental skill training can be a good choice for improving sports performance as well as making them stable in competitions, especially among the youth basketball players at whom psychological stress and relative resistance level to coping with stress are extremely high.

Conclusions

1. The combination of mental and skill training resulted in a substantial enhancement of the stability aspect within performance skills under competitive pressure among U-18 basketball players.

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2. Greater improvements in shooting accuracy, dribbling speed, passing accuracy and basketball performance composite was observed following the proposed training compared to traditional method.
3. Mental training led to a decrease in the competitive pressure and performance anxiety which had a positive effect on the quality of the technical performance.
4. Mental Practice training plus breathing control, imagery and progressive relaxation not only enhanced the level of concentration, attentional focus and self-confidence in players.
5. The integrated training regimen proved to be effective in order to enhance psychological and skill balance of young footballers.
6. The results supported the conclusion that psychological preparation is an indispensable and supplementary factor in basketball skill training.
7. The suggested program can be implemented as a contemporary young basketball player training model.

Recommendations

1. Mental training should be incorporated into daily basketball team practice programs, especially for younger (youth/junior) players.
2. Educating coaches in the application of contemporary mental training methods (e.g., imagery; relaxation; attentional control).
3. The inclusion of psychological preparation courses in the curriculum of colleges of physical education and sport sciences.
4. Application of the suggested training model in sports clubs, academies and talent development centers.
5. Extending investigations to other psychological variables, such as motivation, mental toughness, and emotional resilience.
6. Application of new technologies (e.g., virtual reality, video) to aid the mental preparation.

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