



## THE RELATIONSHIP OF CORE STRENGTH WITH SELECTED PHYSICAL AND SKILL-RELATED ABILITIES IN FOOTBALL

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### ABSTRACT

**Background.** This study investigates the relationship between core strength and selected physical and skill-related abilities in football among junior players enrolled in the Football School for Sports Talent Development in Basra during the 2024–2025 academic year. Core strength is widely recognized as a fundamental component of athletic performance, playing a crucial role in stability, movement efficiency, and injury prevention. However, its direct impact on football-specific abilities requires further exploration. **Objectives.** The primary objective of this research was to identify the correlation between core strength and the development of physical and technical abilities essential for football performance. **Method.** The researchers employed the descriptive method with a survey approach, as it was appropriate for the nature of the variables and the research objectives. A purposive sample of 25 junior players from the National Center for Sports Talent Development was selected to represent the research population. Data collection involved a specialized questionnaire validated by experts, alongside a researcher-designed test to measure core strength. The data were statistically analyzed using the SPSS program. **Results.** The results demonstrated a significant relationship between core strength and selected physical abilities (such as balance, agility, and endurance), as well as skill-related abilities (including ball control, passing accuracy, and shooting precision). Players with stronger core muscles exhibited superior physical performance and more efficient execution of football-specific skills. **Conclusion.** In conclusion, the study emphasizes the importance of core strength in enhancing both physical and technical performance in football. The researchers recommend integrating core-strengthening exercises into training programs to optimize athletic development and competitive success.

**Keywords;** core strength, balance, coordination, dribbling, ball control.



## A. INTRODUCTION

The integration of modern sciences into sports has become one of the most effective strategies for improving athlete performance and developing future talent. In competitive football, where precision, endurance, and agility are essential, coaches and researchers constantly seek to identify the hidden factors that influence differences in performance (Gorskaya et al., 2022). Despite undergoing similar training regimens, athletes often display varied levels of mastery in both physical and technical skills (Rubiyatno et al., 2023). This raises an important question for sports specialists: why do some players outperform others when their training loads, anthropometric characteristics, and learning opportunities appear to be the same? Understanding the sources of these differences is fundamental for guiding training interventions and optimizing talent development.

One factor increasingly recognized in sports science is the role of the body's core. The core, which accounts for 30–40% of total muscle mass, acts as the anatomical center of gravity and the transmission channel between the upper and lower body. Strong core muscles stabilize the trunk, enhance movement efficiency, and support nearly all physical and technical actions in football (Atli, 2021). For example, sprinting, jumping, tackling, passing, and shooting all rely on coordinated core activation. Furthermore, studies indicate that players with superior core stability demonstrate improved balance, agility, and movement control, which translate into more accurate and efficient skill execution (Gorskaya et al., 2022; Saputra et al., 2023).

Football training often emphasizes endurance, strength, and technical drills; however, the core's specific role in differentiating skill performance is still underexplored, (Juli et al., 2023) particularly in youth development contexts. Existing research has established general links between core stability and sports performance across various disciplines, but fewer studies have examined this relationship within football-specific settings (Ivanov, 2025a; Ream & Jung, 2025). Moreover, most prior investigations focus on professional or senior athletes, leaving a gap in understanding how core strength affects junior players at the talent development stage. This gap highlights the novelty and importance of examining core strength as a key factor shaping both physical and technical abilities among young footballers.

In practice, coaches frequently observe discrepancies among players with similar anthropometric features and identical training exposure. Such differences are often challenging to explain, leading to uneven skill mastery within teams. For instance, some players consistently display higher accuracy in passing or greater endurance during matches despite following the same training plans (Bavlı & Koç, 2018). As an AFC-licensed coach at the Football School for Sports Talent Development in Basra, the researcher observed these patterns firsthand, motivating the need to investigate the physiological basis behind them. Identifying whether core strength is a decisive factor may provide coaches with actionable insights to bridge gaps between players and reduce inconsistencies within teams (Turna, 2020).

The present research therefore focuses on exploring the correlation between core strength and selected physical and skill-related abilities among junior players at the Football School for Sports Talent Development in Basra. By employing a descriptive approach and correlational analysis, the study aims to clarify whether differences in core strength can explain variations in balance, agility, and endurance, as well as technical skills such as ball control, passing, and shooting. Establishing this relationship will not only contribute to academic knowledge but also provide evidence-based guidance for football training practices (Ivanov, 2025a; Ream & Jung, 2025).

Ultimately, the novelty of this study lies in its focus on young football players within a specialized talent development program in Iraq, a context that has received little empirical attention in previous literature. By addressing this research gap, the study contributes to both theory and practice: it enriches scientific understanding of the role of core strength in football performance, and it equips coaches with strategies to design training programs that prioritize core development. Such interventions can help minimize disparities in player performance, reduce errors during matches, and promote greater tactical cohesion within teams.

## **B. METHOD**

### *Participant*

The research population consisted of junior players enrolled at the Football School for Sports Talent Development in Basra during the 2024–2025 academic season. Out of the 25

available players, goalkeepers were excluded because their physical and technical requirements differ from outfield players. The final sample therefore included 22 outfield players, representing 88% of the total population. The sample was selected deliberately to ensure that it accurately reflected the study's objectives.

### *Research Design*

This study adopted the descriptive method using a survey approach, as it was suitable for identifying the relationship between the variables under investigation. The descriptive approach is widely used in sports science because it provides an accurate analysis of the current state of phenomena and reveals correlations among variables (Allawi & Al-Ratib, 1999). In this study, the key variables included core strength, selected physical abilities (balance and coordination), and skill-related abilities (dribbling and ball control). The researchers designed a specific core strength test and supplemented it with established physical and skill tests validated in prior studies.

### *Procedure*

The research was conducted in several stages. First, two pilot experiments were implemented in March 2025 to evaluate the feasibility, reliability, and validity of the tests. The first pilot study (March 8) aimed to identify practical obstacles in administering the tests, while the second (March 12) was used to establish test validity and reliability. A retest was conducted seven days later (March 19) on a subsample of eight players to confirm reliability.

The main experiment was carried out on March 21, 2025, involving 22 players on the training fields of Basra Sports City. The players performed the following tests:

1. Core strength was measured using a specially designed device consisting of a belt attached to an electronic scale, recording forward and backward trunk pulling forces.
2. Physical abilities were assessed through the Static Balance Test (Fleishman), the Standing on Toes Test, and the Numbered Circles Test for coordination.
3. Skill-related abilities were assessed through a standardized dribbling test (zigzag cones) and a ball control test (juggling within a 2.5 × 2.5 m area).



**Figure 1.** Illustrates The Procedure For Performing The Designed Core Strength Test.

To ensure scientific rigor, the tests were evaluated for validity, reliability, and objectivity. Expert review (face validity), concurrent validity with a plank test, and construct validity correlations confirmed the robustness of the core strength test. Reliability was verified through test-retest correlations, while objectivity was established through inter-rater comparisons. Table 1 presents the validity results of the core strength test.

**Table 1.** Validity Results for the Core Strength Test

No.	Type of Validity	Reference / Sample	Results (R Value)	Sig.	Significance
1	Face Validity	10 Experts	100%	—	—
2	Concurrent Validity	10 Players vs. Plank Test	0.991	0.00	Significant
3	Construct Validity	Core ↔ Balance	0.84	0.00	Significant
		Core ↔ Coordination	0.89	0.00	Significant
		Core ↔ Dribbling	0.86	0.00	Significant
		Core ↔ Ball Control	0.82	0.00	Significant

**Table 2.** Reliability of the Core Strength Test

No.	Variable	R Value	Sig.	Significance
1	Core Strength Test	0.89	0.000	Significant

**Table 3.** Objectivity of the Core Strength Test

No.	Variable	R Value	Sig.	Significance
1	Core Strength Test	0.99	0.001	Significant

### Data Analysis

All collected data were processed using the SPSS statistical software. Descriptive statistics (means, standard deviations, and percentages) were first calculated to summarize the sample characteristics and test results. To examine the relationships between core strength and the selected physical and skill-related abilities, the Pearson correlation coefficient ( $r$ ) was employed. Statistical significance was set at the 0.05 level, allowing the researchers to determine whether observed relationships were meaningful and not due to chance.

### C. RESULTS AND DISCUSSION

#### Results

The analysis of the relationship between core strength and selected physical abilities showed strong positive correlations. Table 4 shows the results for balance and coordination.

**Table 4.** Correlation between Core Strength and Physical Variables

No.	Test	Calculated (R) Value	Sig.	Significance
1	Core Strength ↔ Balance	0.81	0.001	Significant
2	Core Strength ↔ Coordination	0.91	0.000	Significant

The results reveal that core strength is strongly correlated with balance ( $r = 0.81$ ,  $p = 0.001$ ). This indicates that players with greater core strength were able to maintain body stability for longer durations, confirming the essential role of the trunk muscles in supporting postural control. Similarly, a very strong relationship was observed between core strength and coordination ( $r = 0.91$ ,  $p < 0.001$ ). This suggests that players with stronger cores demonstrated superior ability to synchronize movements between the lower limbs and visual tracking, which is critical in complex football tasks such as changing direction, marking opponents, and transitioning quickly during play. Overall, these findings support the idea that the core acts as the central stabilizing system that enhances physical efficiency in football.

**Table 5.** Correlation between Core Strength and Skill Variables

No.	Test	R Value	Sig.	Significance
1	Core Strength ↔ Dribbling	0.93	0.000	Significant
2	Core Strength ↔ Ball Control	0.88	0.001	Significant

The strongest relationship was observed between core strength and dribbling performance ( $r = 0.93$ ,  $p < 0.001$ ). This finding highlights that players with well-developed core strength demonstrated greater speed and control when maneuvering the ball through obstacles, likely due to enhanced trunk stability and efficient force transfer between the upper and lower body. Additionally, a strong correlation was found between core strength and ball control ability ( $r = 0.88$ ,  $p = 0.001$ ). This indicates that players with higher core strength were able to execute more controlled and precise touches during juggling, reflecting their superior stability, balance, and motor coordination. These results emphasize the critical role of the core in mastering technical football skills that demand precision, stability, and quick adjustments. Table 5 presents the findings for dribbling and ball control.

## **Discussion**

The results of this study demonstrated a strong and significant relationship between core strength and physical as well as skill-related abilities in football. Specifically, core strength was found to be strongly correlated with balance ( $r = 0.81$ ), coordination ( $r = 0.91$ ), dribbling ( $r = 0.93$ ), and ball control ( $r = 0.88$ ). These findings suggest that the trunk muscles, which serve as the anatomical center of stability and the channel of force transmission between the upper and lower extremities, play a decisive role in shaping both physical and technical performance among junior football players.

The correlation between core strength and balance confirms the stabilizing function of the trunk muscles, which provide structural support and maintain equilibrium during static and dynamic actions. This is in agreement with Barati et al. (2013), who reported that core muscle endurance explained up to 81% of the variance in static balance. Similarly, Granacher et al. (2013) highlighted that strengthening the core contributes to greater postural control, thereby enhancing both performance and injury prevention. These findings reinforce the theoretical assumption that improvements in core endurance directly translate into improved balance, an essential component of football performance.

The relationship between core strength and coordination ( $r = 0.91$ ) reflects the role of trunk stability in synchronizing limb movements and refining neuromuscular communication. Behm and Colado (2012) argued that core training enhances open-skill performance by improving neuromuscular coordination, which is particularly relevant in

tasks requiring rapid changes of direction or complex dribbling movements. The present study's findings on dribbling ability ( $r = 0.93$ ) strongly support this view, showing that stronger core muscles enable players to control the ball more effectively under dynamic conditions. Bompa and Buzzichelli (2019) further confirmed that core strength training enhances coordination by refining movement precision and supporting high-level technical execution.

The positive relationship between core strength and ball control ( $r = 0.88$ ) emphasizes the importance of trunk stability in fine motor control. Granacher et al. (2013) and Roshdy (2018) both stressed that weak core muscles undermine stability and reduce the efficiency of motor coordination, leading to difficulties in executing precise skills such as juggling or passing. This suggests that youth players with superior core strength can manage the ball more efficiently, execute complex skills under pressure, and maintain higher levels of technical consistency (Hussein & Ebrahim, 2025; Ivanov, 2025b; Rubiyatno et al., 2023).

While these findings are strongly supported by prior research, some studies have suggested that the contribution of core strength to skill performance may not always be direct. For example, (Hussein & Ebrahim, 2025) found limited correlations between core strength and athletic performance in some team sports, suggesting that technical skills may depend more heavily on sport-specific practice than on generalized physical strength. Likewise, (Abdulsatar, 2024) reported that core training alone may not significantly enhance skill execution unless integrated into a comprehensive football training program. These contrasting perspectives highlight the importance of contextualizing the present results: while core strength clearly plays a central role in stabilizing movements, its effect is likely maximized when combined with technical, tactical, and psychological preparation (Hardinata et al., 2023; Turna, 2020).

Despite its contributions, this study has several limitations. First, the sample size was relatively small (22 players), which may restrict the generalizability of the findings to wider populations of football players. Second, the study focused exclusively on junior players from a single training center in Basra, and results may differ in older or professional athletes with more advanced physical and technical development. Third, the study used a researcher-designed core strength test; although validated, it may not fully capture the

multidimensional aspects of core performance such as rotational strength or dynamic stability. Finally, the research design was correlational, which prevents establishing causality. Experimental or longitudinal designs would be required to confirm whether improvements in core strength directly cause improvements in balance, coordination, or skill performance.

#### **D. CONCLUSION**

Taken together, the findings of this study highlight that core strength is a fundamental determinant of both physical and skill-related abilities in football. By enhancing stability, improving neuromuscular coordination, and supporting fine motor control, stronger core muscles enable players to execute skills such as balance, coordination, dribbling, and ball control with greater efficiency and precision. The study therefore concludes that core strength has a significant impact on football performance, underscoring its role in shaping both physical and technical development. Based on these results, it is recommended that training programs systematically integrate core-strengthening exercises, alongside flexibility and agility training, to ensure balanced physical development and to reduce potential conflicts between training demands. At the same time, the results should be interpreted cautiously given the study's limitations, and future research is encouraged to involve larger and more diverse samples, as well as longitudinal and experimental designs, to validate and extend these findings within broader football training contexts.

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#### **F. AUTHOR CONTRIBUTION STATEMENT**

This study was conceived, designed, and conducted solely by Hussein Ahmed Salman and M. Hashim Mutab Taha, who was responsible for formulating the research

problem, designing the methodology, collecting and analyzing the data, interpreting the results, and preparing the manuscript for publication.

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