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The Effect of a Period of Basic Football Skills Training on Perceived Competence and Physical Abilities of Beginner Football Learners in Iraq: The Moderating Role of Age

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A B S T R A C T

Purpose: The purpose of the present study was to examine the effect of a period of basic football skills training on perceived competence and physical abilities among boys aged 9 to 12 years.

Methods and Materials: The research method was quasi-experimental with a pretest–posttest design and a control group. The statistical population consisted of elementary school boys and football school trainees in Maysan City, Iraq. From this population, 60 participants were purposefully selected and assigned to four groups: three experimental groups aged 9–10, 10–11, and 11–12 years (each consisting of 15 participants) who participated in the training protocol, and one control group (15 participants) who received no intervention. The mean age of the control group was 10.6 years, which was approximately in the middle of the experimental age range. The training protocol lasted eight weeks with three sessions per week and focused on basic football skills, including dribbling, passing, shooting, coordination, and small-sided games. The research instruments included the Perceived Physical Competence Scale for Children and a set of standardized physical fitness tests such as the Yo-Yo test, Sargent jump test, Illinois agility test, 20-meter sprint, and sit-and-reach test. Data were analyzed using analysis of covariance (ANCOVA) and Bonferroni post hoc tests.

Findings: The results showed that basic football skills training had a significant effect on perceived competence ($F = 15.61$, $p < .001$, $\eta^2 = .31$) and physical abilities ($F = 18.92$, $p < .001$, $\eta^2 = .35$). Moreover, the interaction effects indicated a moderating role of age, as children aged 11 to 12 demonstrated the greatest improvement compared to younger groups, while the control group exhibited minimal changes from the pretest.

Conclusion: These results underscore the importance of designing and implementing structured sports programs in schools and extracurricular contexts and can serve as an effective model for the holistic development of children during the critical ages of 9 to 12 years.

Keywords: *basic football skills, perceived competence, physical abilities, children, quasi-experimental research*

1. Introduction

In recent years, there has been a growing recognition of the multifaceted benefits of youth football training beyond athletic performance, encompassing physical, cognitive, and psychosocial development (Zheng et al., 2025). As one of the most popular sports worldwide, football has been widely used as a pedagogical and developmental tool to cultivate essential life skills, physical literacy, and social competencies in children (Fifa, 2006). During the critical developmental stage between ages 9 and 12, children undergo rapid physical, motor, and cognitive growth that forms the foundation for lifelong engagement in physical activity (Gallahue & Alsman, 2004; Payne & Isaacs, 2017). Football training, when systematically designed and age-appropriate, can play a decisive role in enhancing both motor competence and perceived competence, which are pivotal for long-term participation and psychological well-being (Duncan et al., 2022; Rodrigues et al., 2025).

The developmental framework for physical and motor competence emphasizes the interaction between biological maturation and environmental opportunities (Grygus et al., 2024). Within this framework, structured football programs act as a dynamic context for learning movement coordination, control, and adaptability under varying task and environmental conditions (Kokstejn et al., 2025). As children progress through middle childhood, improvements in motor coordination, balance, and reaction time correspond with advancements in perceptual-cognitive abilities such as anticipation and decision-making (Reinhard et al., 2025; Tokay & Akil, 2025). The integration of technical skill acquisition with cognitive and emotional engagement makes football an effective medium for holistic child development (Akbar et al., 2025; Tafuri et al., 2025).

Age-specific training design has been a central concern in contemporary youth sports science. Studies have consistently shown that training intensity, content, and complexity must align with children's maturational stage and motor readiness to optimize learning and prevent injury (Çapo & Baze, 2025; Stoica & Barbu, 2025). The period between ages 9 and 12 is especially significant because of its sensitivity to neuromuscular adaptation and coordination development (Basarir et al., 2025). According to developmental models, motor competence at this stage not only enhances physical performance but also strengthens children's perceptions of their own abilities, self-efficacy, and motivation to participate in sports (Duncan et al., 2022; Kress et al., 2024). This alignment between actual and perceived competence supports a self-reinforcing cycle of engagement and improvement, as described in models of motor learning and psychological growth (Rodrigues et al., 2025).

The physical demands of football—combining aerobic endurance, anaerobic power, agility, and strength—stimulate both musculoskeletal and cardiovascular systems (Dengel et al., 2024; Farley et al., 2024). The game's repetitive yet variable movement patterns provide continuous opportunities for children to refine control, stability, and precision (Hadavi, 2017; Igamberdiev, 2024). Moreover, the format of small-sided games has gained particular importance in recent years due to their proven ability to enhance physical, technical, and cognitive performance simultaneously (Aghdasi et al., 2024; Costa et al., 2024). Such formats create environments of higher engagement and more frequent ball contact, which are crucial for improving children's motor confidence and tactical understanding (Fortunato et al., 2024; Williams & Ford, 2008).

Psychological development is also intricately linked with physical competence in football settings. Children's self-perception of competence—defined as their belief in their ability to perform physical tasks successfully—has been identified as a critical determinant of both motivation and continued participation (Zheng et al., 2025). The enhancement of perceived competence through structured football programs promotes intrinsic motivation, self-esteem, and resilience, all of which contribute to the psychological health of young athletes (Sadeghi et al., 2019; Stefanica et al., 2024). In this context, football serves not only as a sport but also as a psychosocial intervention that fosters self-regulation, teamwork, and persistence (Al-Saeedi, 2025; Stamenkovic et al., 2024).

Empirical research demonstrates that consistent participation in football-based activities improves children's motor coordination, muscular strength, balance, and agility, which are the foundation of physical literacy (Basarir et al., 2025; Grygus et al., 2024). These gains are accompanied by significant improvements in psychosocial outcomes, such as attention regulation, cooperation, and emotional control (Primasoni et al., 2024; Sendil et al., 2024). Football training thus represents a multisystemic approach that integrates body and mind in the service of development (Akbar et al., 2025; Reinhard et al., 2025). The complexity of football—requiring continuous decision-making under physical constraints—promotes neural adaptations associated with

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improved attentional control and cerebellar-cortical connectivity (Y. Wang et al., 2025).

Age differences remain one of the most influential moderators of training outcomes in youth football. Research shows that older children (11–12 years) often demonstrate greater adaptation to training stimuli than younger children, owing to maturational factors such as neuromuscular coordination and hormonal development (Beyaz, 2025; Çapo & Baze, 2025). Longitudinal data also reveal that improvements in physical fitness and skill competence tend to follow a non-linear trajectory, emphasizing the need for age-appropriate load management (Stoica & Barbu, 2025; Sun et al., 2025). Coaches and educators are thus encouraged to design progressive and differentiated training models that adjust for developmental readiness while maintaining psychological engagement (Grygus et al., 2024; Rodrigues et al., 2025).

In this regard, modern coaching approaches emphasize the integration of motor learning principles with pedagogical creativity. Methods such as "creative dance and football" training have been shown to foster cognitive flexibility, executive function, and kinesthetic awareness in young children (Tokay & Akil, 2025). Similarly, coordination-based programs improve not only motor performance but also inhibitory control and attentional capacities (Basarir et al., 2025; Sendil et al., 2024). These findings reflect the shift from a purely physical training paradigm toward a **psychomotor** model that regards movement as a form of embodied cognition (Stefanica et al., 2024).

The neurocognitive dimension of football training has been further substantiated by neuroimaging studies showing that repeated perceptual–motor tasks enhance connectivity between the cerebellum and cortical areas responsible for attention, working memory, and decision-making (J. Wang et al., 2025; Y. Wang et al., 2025). These brain–behavior correlations provide a mechanistic understanding of how football training supports not only physical but also mental development in children. The inclusion of complex, dynamic exercises—requiring anticipation, spatial reasoning, and reaction control—serves as a form of "cognitive enrichment" that parallels academic learning outcomes (Reinhard et al., 2025; Tokay & Akil, 2025).

From a physiological standpoint, training programs that incorporate diverse modalities—such as aerobic intervals, agility drills, and coordination tasks—have shown superior outcomes in muscular strength, motor coordination, and body composition compared to conventional drills (Fortunato et al., 2024; Pyne et al., 2005). For example, small-sided football and recreational formats are particularly effective in improving cardiorespiratory endurance and metabolic health in children and adolescents (Li et al., 2025; Stamenkovic et al., 2024). Such activities also support musculoskeletal growth and balance, contributing to healthier body composition profiles across age groups (Dengel et al., 2024; Farley et al., 2024).

Educational and institutional settings have recognized football as a key vehicle for promoting health and social inclusion. School-based interventions that integrate structured football sessions into the curriculum have been found to enhance physical activity levels, aerobic capacity, and sleep quality among primary school children (Costa et al., 2024; Rodrigues et al., 2025). Additionally, inclusive and unified football programs contribute to the development of empathy, cooperation, and mutual respect among children with diverse abilities (Stefanica et al., 2024). These psychosocial benefits highlight the sport's potential as a medium for social learning and moral education (Zheng et al., 2025).

Emerging technologies have further expanded the frontiers of football pedagogy. Artificial intelligence and data-driven models are now being used to analyze athletes' biomechanical and physiological parameters to design personalized training plans (Tafuri et al., 2025). Such innovations, when combined with developmental psychology principles, enable more precise and adaptive coaching strategies for youth populations. Nonetheless, experts caution that technology should complement—not replace—the experiential and interpersonal aspects of learning that are fundamental in early sports education (Reinhard et al., 2025; Williams & Ford, 2008).

At the grassroots level, the success of youth football training depends on balancing structured practice with enjoyment and creativity. Programs that overemphasize competition or physical load can inadvertently reduce motivation and self-perception of competence, particularly in younger players (Aghdasi et al., 2024; Grygus et al., 2024). Conversely, developmentally appropriate and game-based approaches promote sustained participation, positive affect, and resilience (Kokstejn et al., 2025; Rodrigues et al., 2025). The "Football for the Future" initiative by FIFA underscores this philosophy by advocating a child-centered, play-oriented model that nurtures both skill and character (Fifa, 2006).

In sum, the cumulative evidence across physiological, psychological, and pedagogical domains demonstrates that structured football training can simultaneously enhance

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motor competence, physical performance, and perceived self-efficacy in children (Aghdasi et al., 2024; Farley et al., 2024; Stoica & Barbu, 2025). However, the moderating role of age in determining the magnitude of these effects remains underexplored, particularly among boys aged 9–12 years—a developmental window marked by significant variability in growth and coordination.

Therefore, the present study aims to examine the effect of an eight-week basic football skills training program on perceived competence and physical abilities among Iraqi boys aged 9–12 years, with age considered as a moderating factor.

2. Methods and Materials

2.1. Study Design and Participants

The research method in this study was quasi-experimental with a pretest–posttest control group design. This approach allowed the researcher to examine the effect of the training intervention on the experimental groups compared with the control group. Given that the study aimed to measure the changes resulting from a sports program on children's physical indicators, the use of a quasi-experimental design was considered the most appropriate option.

The research design included three experimental groups and one control group. The experimental groups consisted of boys in three age ranges: 9–10, 10–11, and 11–12 years, who participated in a basic football skills training program. The control group consisted of participants of similar age and conditions but received no intervention. All groups were assessed on performance and physical competence indices at the beginning of the study, and the same tests were re-administered after completion of the training period. This design allowed for the comparison of changes between the experimental groups and the control group.

The statistical population of this study included all male beginner football learners aged 9 to 12 years in the city of Maysan, Iraq, who were enrolled in youth football clubs. This population was selected because, at these ages, cognitive, perceptual, and physical development is still in progress, and the effects of educational and sports interventions can be clearly observed.

From the statistical population, a total of 60 participants were selected as the research sample. This sample size was determined based on the scientific standards of quasi-experimental study design and with adequate statistical power for testing (Kerlinger & Lee, 2012; Cohen, 1992). The sample was divided into four equal groups: three experimental groups with 15 participants each in the age ranges of 9–10, 10–11, and 11–12 years, and one control group of 15 participants with similar characteristics.

The sampling method was convenience-based and conducted through visits to selected football clubs and elementary schools. After preliminary screening and obtaining parental consent, participants were enrolled in the study. To reduce bias, participants were distributed across groups to achieve homogeneity in terms of age and physical condition.

2.2. Measures

Perceived Competence Measurement. The primary instrument in this domain was first designed by Ryckman and colleagues as the 22-item Physical Self-Efficacy scale comprising two subscales—Perceived Physical Ability and Physical Self-Presentation Confidence (Ryckman et al., 1982). The Perceived Physical Ability subscale was later translated and adapted into Italian for older children and adolescents by Bortoli and Robazza, yielding a 10-item version assessing strength, speed, agility, and motor skill (Bortoli & Robazza, 1997). To ensure suitability for younger children (<10 years), Colella and colleagues simplified selected items from the Bortoli–Robazza version, producing a 6-item child-friendly scale covering strength, speed, and coordination, with a 4-point response format from "very weak/slow" to "very strong/fast," including both direct and reverse-scored items; total scores range from 6 to 24, with higher values indicating greater perceived physical ability (Colella et al., 2008). This children's scale has demonstrated acceptable reliability (Cronbach's $\alpha \approx .72$) and sound validity evidence.

Body Mass Index (BMI). BMI was assessed prior to warm-up by measuring standing height and body mass and then calculating BMI as weight (kg) divided by height squared (m^2), providing a standard anthropometric index of relative body size commonly used in pediatric exercise studies.

Yo-Yo Intermittent Recovery Test. Aerobic fitness was measured using the Yo-Yo test, an incremental shuttle-run with interspersed recovery periods that simulates the stop-and-go nature of invasion games; distances are completed between marked cones over a 25-m course following audio beeps until volitional exhaustion or two consecutive failures, with performance recorded as level-shuttle or total distance. The test shows strong convergent validity with maximal oxygen uptake (VO_2max; $r \approx .92$) and predicts match

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running performance and high-intensity efforts; test–retest reliability is excellent (ICC ≈ .94; SEM < 5%).

Vertical Jump (Sargent Test). Anaerobic lower-limb power was assessed using the Sargent vertical jump, a classic field test in which participants perform maximal countermovement jumps adjacent to a calibrated board or device; jump height is computed as the difference between standing reach and maximal jump reach, and the protocol has a century-long pedigree in physical performance assessment (Sargent, 1921).

Illinois Agility Test. Agility was measured with the Illinois Agility Test over a 10 × 5 m course with cones marking start/finish, turning points, and a central slalom; participants start prone with chest on the floor and sprint through a prescribed route as fast as possible. The test has demonstrated substantial validity (reported rs up to .46 with anaerobic performance) and high reliability (intra-test r > .90), and has been widely endorsed as a robust agility assessment across ages (Hadavi, 2017).

AFL Fitness Tests: 20-m Sprint, AFL Agility/Reaction, and Sit-and-Reach. Speed and acceleration were evaluated via a 20-m sprint (with specific interest in initial 0–5 m acceleration relevant to separation from opponents), agility/reaction via the AFL agility test emphasizing rapid direction changes and decision speed, and flexibility via the modified Sit-and-Reach test targeting hamstrings and lumbar extensibility. These field measures possess acceptable psychometric properties: the 20-m sprint shows high within-session reliability (ICC > .90) and criterion validity with football speed indices; AFL agility demonstrates reliability of approximately .85–.92 with moderate convergent validity to match performance (≈ .50–.60); and Sit-and-Reach exhibits intersession reliability > .80 with moderate correlations to direct flexibility measures (≈ .40–.70) (Pyne et al., 2005; Wells & Dillon, 1952).

2.3. *Intervention*

The training intervention was an eight-week structured basic football skills program designed to enhance perceived competence and physical abilities (strength, speed, agility, and endurance) among boys aged 9 to 12 years. The program consisted of three 60-minute sessions per week, totaling 24 sessions. Each session included a standardized warm-up (10 minutes of light jogging, stretching, and coordination drills), a main skills segment (40 minutes), and a cool-down phase (10 minutes of relaxation and flexibility exercises). Training intensity and complexity were progressively increased across the intervention period. During weeks 1–2, sessions focused on ball control, short passing, and simple games at light-to-moderate intensity. Weeks 3–4 emphasized dribbling, passing on the move, short shooting, and 3×3 small-sided games at moderate intensity. In weeks 5–6, participants engaged in combined drills, long-range shooting, and 4×4 tactical play at moderate-to-high intensity. Finally, weeks 7–8 concentrated on multitask exercises, rapid decision-making, and 5×5 competitive games performed at high intensity. All sessions were supervised by certified football coaches, and the training followed age-appropriate progressions emphasizing enjoyment, safety, and gradual motor skill development.

2.4. *Data Analysis*

Data were analyzed using analysis of covariance (ANCOVA) and the Bonferroni post hoc test via SPSS.

3. Findings and Results

The demographic characteristics of the participants are presented as follows. The study included a total of 60 boys divided into four groups of 15 participants each. The first experimental group (aged 9–10 years) had a mean age of 9.6 years, an average height of 136.2 cm, a mean weight of 32.8 kg, and an average of 6.2 months of prior sports experience. The second group (aged 10–11 years) had a mean age of 10.5 years, an average height of 141.8 cm, a mean weight of 35.6 kg, and a mean sports experience of 8.1 months. The third group (aged 11–12 years) had a mean age of 11.4 years, an average height of 147.3 cm, a mean weight of 38.4 kg, and an average of 10.3 months of prior sports experience. The control group had a mean age of 10.7 years, an average height of 142.6 cm, a mean weight of 36.2 kg, and an average of 7.5 months of sports experience. Overall, the demographic data indicated that the groups were relatively homogeneous in physical and experiential characteristics prior to the intervention.

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Table 1

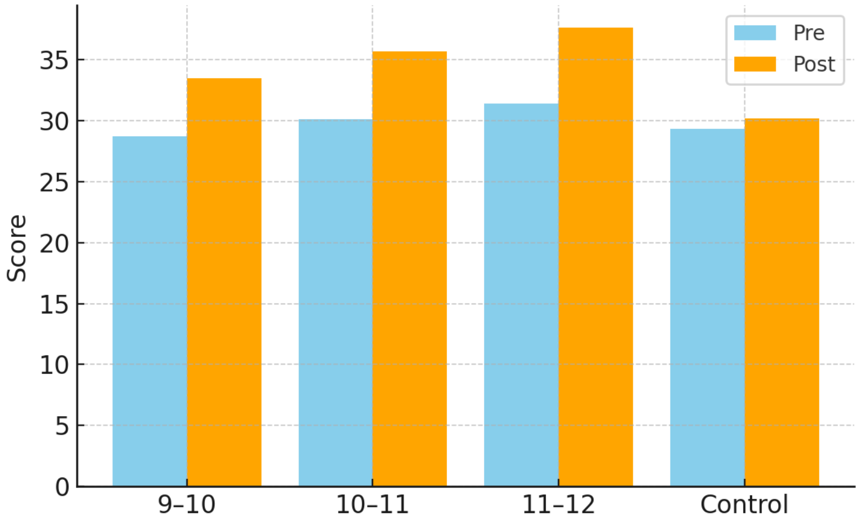
Descriptive Statistics for Perceived Competence (Colla Scale)

Group	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD
9–10	28.7	2.9	33.5	3.1
10–11	30.1	3.0	35.7	3.3
11–12	31.4	3.2	37.6	3.4
Control	29.3	3.1	30.2	3.2

Figure 1

Screening Process of Studies According to Inclusion and Exclusion Criteria

Figure 4-6. Mean of Perceived Competence (Colla Scale) in the Study Groups



The figure shows that the mean level of perceived competence in the experimental groups (9–10, 10–11, and 11–12 years) increased significantly after the implementation of the training program, whereas the control group exhibited almost no change in perceived competence. This finding indicates that basic football skills training had a positive effect on the learners' perception of their own abilities.

Table 2

Descriptive Statistics for Physical Abilities

Index	9–10 Group	10–11 Group	11–12 Group	Control Group
Body Mass Index (Pretest)	18.1	18.4	18.7	18.3
Body Mass Index (Posttest)	17.8	18.0	18.3	18.2
Aerobic Power (Pretest, m)	360	380	400	390
Aerobic Power (Posttest, m)	420	450	480	400
Anaerobic Power (Pretest, cm)	24.3	25.6	26.9	25.0
Anaerobic Power (Posttest, cm)	27.6	28.8	30.1	25.4
Agility (Pretest, sec)	20.6	20.1	19.7	20.3
Agility (Posttest, sec)	19.1	18.6	18.0	20.0
Speed (Pretest, sec)	4.45	4.41	4.38	4.42
Speed (Posttest, sec)	4.21	4.15	4.08	4.40

The results indicate that basic football skills training led to improvements in aerobic power, anaerobic power, agility, and speed in the experimental groups, while the control group showed no significant changes.

One of the main assumptions of analysis of covariance (ANCOVA) is the linear relationship between pretest and posttest scores of the variables. To test this assumption, scatter plots between pretest and posttest scores for perceived competence and physical abilities were drawn. As

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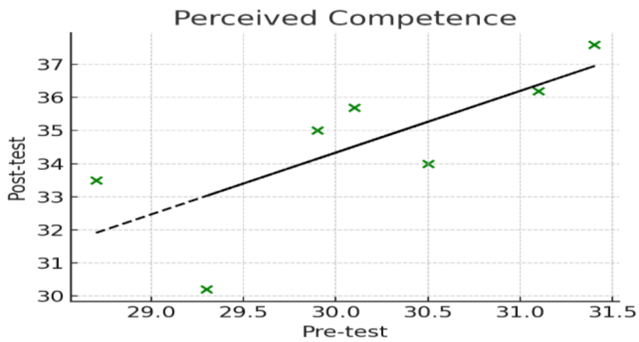
seen in the plots, the points were distributed around a linear trend line, showing that increases in pretest scores corresponded to proportional increases in posttest scores. This confirmed that the assumption of linearity was met.

Figure 2

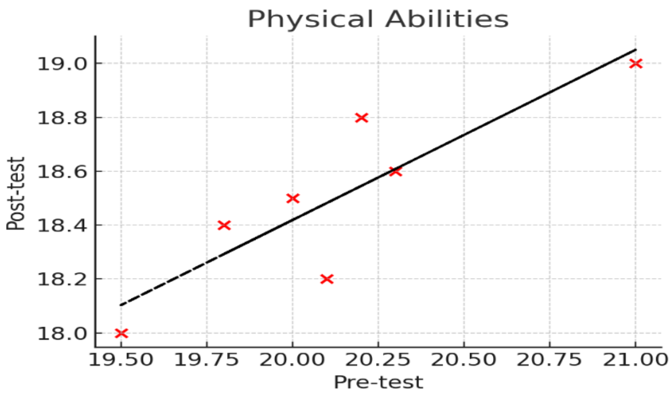
Scatter Plot of Perceived Competence



This figure illustrates the relationship between pretest and posttest scores for perceived competence. The distribution of points suggests a positive linear relationship—meaning that higher pretest levels of perceived competence corresponded to higher posttest levels. The drawn trend line clearly represents this relationship. Therefore, it can be concluded that the assumption of linearity for perceived competence was confirmed.

Figure 3

Scatter Plot of Physical Abilities



This scatter plot depicts the relationship between pretest and posttest scores for physical abilities. The data points are approximately aligned along a straight line, and the trend line shows a gradual increase in posttest scores as pretest scores increase. This indicates a linear relationship between the covariate and the dependent variable for physical abilities, confirming the linearity assumption.

Another assumption of ANCOVA is the equality of variances across groups. The Levene's test for homogeneity of variances showed that for perceived competence ($F = 0.98$, $p = 0.35$) and physical abilities ($F = 1.42$, $p = 0.24$), the significance levels were greater than .05, confirming the equality of variances across groups. Similarly, the Kolmogorov–Smirnov test for normality demonstrated that the distributions of all variables were normal, with K–S = 0.64 ($p = 0.81$) for perceived competence pretest, K–S = 0.73 ($p = 0.66$) for perceived competence posttest, K–S = 0.85 ($p = 0.52$) for physical abilities pretest, and K–S = 0.79 ($p = 0.58$) for physical abilities posttest. Since all significance levels exceeded the .05 threshold, the assumptions of homogeneity of variances and normality were both satisfied, validating the use of ANCOVA for hypothesis testing.

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Table 3

ANCOVA Results for Perceived Competence

Source of Variation	Mean Square	df	F	Sig.	Eta	Result
Pretest (Covariate)	39.28	1	10.75	0.002	0.16	Significant
Group	52.13	3	14.86	0.000	0.23	Significant
Error	3.51	55	–	–	–	–
Total	–	60	–	–	–	–

The results show that the effect of the pretest on posttest perceived competence was significant ($F = 10.75$, $p = .002$). The group effect was also significant after controlling for pretest scores ($F = 14.86$, $p < .001$, $\eta^2 = .23$). These findings indicate that basic football skills training significantly increased children's perceived competence, with significant differences between experimental and control groups. Pairwise comparisons revealed that perceived competence was higher in the experimental groups than in the control, with greater improvement observed in older participants.

Table 4

Bonferroni Pairwise Comparisons for Perceived Competence

Pairwise Comparison	Adjusted Mean Difference	95% CI	Sig. (Bonf.)	Cohen's d	Result
9–10 – Control	3.1	1.9–4.3	0.000	0.81	Significant
10–11 – Control	5.3	4.0–6.6	0.000	1.36	Significant
11–12 – Control	7.2	5.9–8.5	0.000	1.80	Significant
10–11 – 9–10	2.2	0.9–3.5	0.002	0.56	Significant
11–12 – 9–10	4.1	2.8–5.4	0.000	1.04	Significant
11–12 – 10–11	1.9	0.6–3.2	0.007	0.48	Significant

Perceived competence increased in all training groups compared with the control group, and the ascending trend from ages 9–10 to 11–12 indicates that the effect of training was stronger at older ages. Therefore, the second research hypothesis was confirmed, and the null hypothesis was rejected.

Table 5

ANCOVA Results for Physical Abilities

Source of Variation	Mean Square	df	F	Sig.	Eta	Result
Pretest (Covariate)	42.79	1	11.92	0.001	0.17	Significant
Group	64.25	3	18.04	0.000	0.28	Significant
Error	3.56	55	–	–	–	–
Total	–	60	–	–	–	–

The findings revealed that the pretest effect on posttest physical abilities was significant ($F = 11.92$, $p = .001$). The group effect was also significant ($F = 18.04$, $p < .001$, $\eta^2 = .28$). These results indicate that basic football skills training improved the physical abilities of children in the experimental groups compared with the control group. The results also show that all three experimental groups performed significantly better than the control, with the greatest improvement observed in the 11–12-year-old group.

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Table 6

Bonferroni Pairwise Comparisons for Physical Abilities (Composite Index)

Pairwise Comparison	Adjusted Mean Difference	95% CI	Sig. (Bonf.)	Cohen's d	Result
9–10 – Control	3.5	2.1–4.9	0.000	0.80	Significant
10–11 – Control	8.0	6.6–9.4	0.000	1.81	Significant
11–12 – Control	13.4	12.0–14.8	0.000	3.03	Significant
10–11 – 9–10	4.5	3.0–6.0	0.000	1.02	Significant
11–12 – 9–10	9.9	8.4–11.4	0.000	2.25	Significant
11–12 – 10–11	5.4	4.0–6.8	0.000	1.22	Significant

The posttest physical performance of all three experimental groups was significantly higher than that of the control group, with a clear upward trend from 9–10 to 11–12 years. This means that the benefits of training increased with age. Therefore, the third research hypothesis was confirmed, and the null hypothesis was rejected.

Table 7

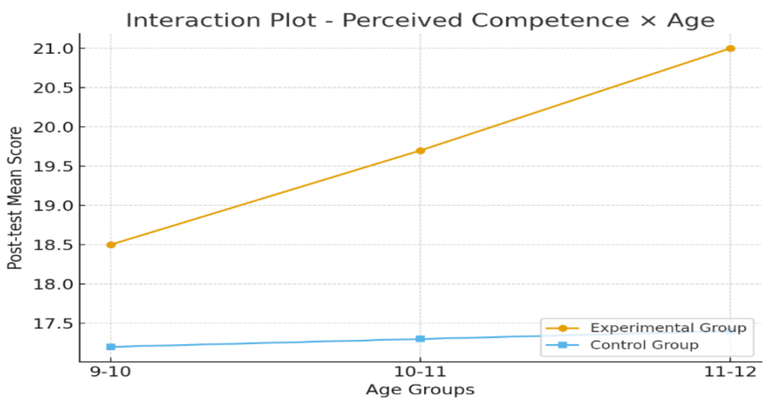
ANCOVA Results for Perceived Competence with the Moderating Role of Age

Source of Variation	Mean Square	df	F	Sig.	Eta	Result
Pretest (Covariate)	37.95	1	10.26	0.002	0.15	Significant
Age Group	23.82	2	6.42	0.003	0.11	Significant
Age Group × Training Interaction	19.41	2	5.26	0.007	0.08	Significant
Error	3.69	54	–	–	–	–
Total	–	60	–	–	–	–

The findings show that the effect of the pretest on posttest perceived competence was significant ($F = 10.26$, $p = .002$). The main effect of age group was also significant ($F = 6.42$, $p = .003$). Most importantly, the interaction effect of age group × training was significant ($F = 5.26$, $p = .007$, $\eta^2 = .08$). To examine this hypothesis, the interaction effect was analyzed within the ANCOVA model, and a corresponding interaction plot was drawn to visualize the mean changes in perceived competence across different age groups.

Figure 4

Interaction Plot for Perceived Competence × Age



As shown in the figure, the mean perceived competence in the experimental group increased progressively with age, with the highest scores observed in the 11–12-year-old group, which exhibited the greatest improvement. In contrast, the control group showed minimal change across all ages, maintaining an almost flat line. This pattern indicates that basic football skills training had a particularly stronger effect on perceived competence in older children (11–12 years).

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Table 8

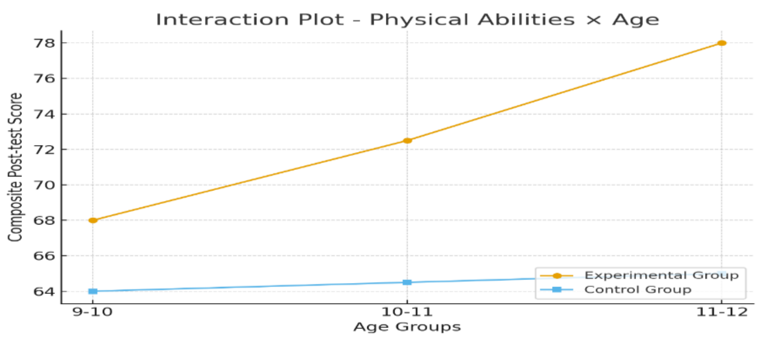
ANCOVA Results for Physical Abilities with the Moderating Role of Age

Source of Variation	Mean Square	df	F	Sig.	Eta	Result
Pretest (Covariate)	41.27	1	11.63	0.001	0.17	Significant
Age Group	27.64	2	7.79	0.001	0.13	Significant
Age Group × Training Interaction	22.83	2	6.43	0.003	0.10	Significant
Error	3.58	54	–	–	–	–
Total	–	60	–	–	–	–

The results showed that the pretest effect on posttest physical abilities was significant ($F = 11.63$, $p = .001$). The main effect of age group was significant ($F = 7.79$, $p = .001$). The interaction effect of age group × training was also significant ($F = 6.43$, $p = .003$, $\eta^2 = .10$). After confirming the significance of this interaction, an interaction plot was drawn to illustrate changes in mean posttest physical abilities across age groups under experimental and control conditions.

Figure 5

Interaction Plot for Physical Abilities × Age



The experimental group's line displayed a clearly upward slope with increasing age, reaching its highest value in the 11–12-year-old group, whereas the control group's line remained almost flat with no notable change. This pattern indicates that the effect of training on physical abilities strengthens with age and that older children benefit more from the intervention. Therefore, the graphical results are consistent with the statistically significant interaction effect.

4. Discussion and Conclusion

The purpose of this study was to examine the effects of an eight-week basic football skills training program on perceived competence and physical abilities among boys aged 9 to 12 years, while exploring the moderating role of age. The results demonstrated significant improvements in both perceived competence and physical performance indicators—including aerobic and anaerobic power, agility, and speed—across all experimental groups, compared with the control group. Moreover, the interaction effects indicated that older participants (ages 11–12) achieved greater gains than younger ones, suggesting that developmental maturation amplifies the effectiveness of structured training interventions. These findings provide empirical evidence for the multidimensional benefits of football-based training during middle childhood and underscore the necessity of tailoring physical education and sports programs according to age and developmental readiness.

The enhancement in perceived competence observed among the experimental groups aligns with the psychological framework proposed by the theory of perceived physical ability, which highlights the role of self-appraisal in fostering motivation and engagement in sports (Zheng et al., 2025). As children successfully acquire motor skills and experience mastery through structured training, they develop higher self-efficacy and confidence in their physical capabilities (Kokstejn et al., 2025; Rodrigues et al., 2025). The results of the present study support this mechanism: the repetitive, structured, and goal-oriented practice in football fundamentals—such as passing, dribbling, and shooting—provided children with measurable indicators of progress and competence. This process likely

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reinforced their intrinsic motivation and satisfaction with learning outcomes, consistent with previous reports emphasizing that mastery experiences in youth sports enhance perceived competence and promote long-term participation (Duncan et al., 2022; Sadeghi et al., 2019).

Furthermore, the observed improvements in perceived competence were particularly pronounced in older participants (11–12 years), confirming the moderating effect of age. This age group may possess more advanced cognitive and motor integration capacities, which enable them to internalize feedback and adjust performance strategies more effectively (Çapo & Baze, 2025; Hadavi, 2017). Age-related maturation contributes to the development of proprioception, fine motor coordination, and decision-making skills, allowing older children to translate physical practice into a deeper sense of capability (Gallahue & Alsman, 2004; Payne & Isaacs, 2017). This interpretation is consistent with findings showing that training effects are amplified during later stages of childhood due to enhanced neuromuscular coordination and greater responsiveness to complex motor learning tasks (Basarir et al., 2025; Stoica & Barbu, 2025).

The second major finding of this study—the significant improvement in physical performance indicators—provides further support for the effectiveness of structured football-based interventions. Participants showed marked increases in aerobic capacity, anaerobic power, agility, and sprint speed after completing the eight-week training program. These results align with the extensive body of research highlighting the comprehensive physical benefits of football training in youth populations (Costa et al., 2024; Farley et al., 2024). Small-sided games, technical drills, and repeated movement tasks in football mimic real-game demands, requiring rapid accelerations, decelerations, and multidirectional movements that stimulate both aerobic and anaerobic energy systems (Primasoni et al., 2024; Pyne et al., 2005). Over time, this dynamic interplay between endurance and explosive actions improves overall physical fitness and functional motor capacity.

The findings correspond closely with those of (Al-Saeedi, 2025), who reported that targeted football training improved the physical fitness components of young players across multiple clubs in Iraq. Similarly, (Beyaz, 2025) demonstrated that a 32-week football program significantly reduced body mass index (BMI) and enhanced motor performance among boys aged 8 to 10 years. These convergent results emphasize the importance of sustained, structured engagement in football training for improving not only technical skills but also anthropometric and physiological parameters. Moreover, as shown in the present study, the combination of progressive overload, frequent practice, and multidimensional skill work can create substantial improvements in children's agility, power, and endurance—capacities that underpin performance in both sports and daily activities (Dengel et al., 2024; Farley et al., 2024).

The moderating influence of age on physical performance in this study corroborates the evidence from developmental kinesiology suggesting that older children exhibit superior adaptive responses to training (Çapo & Baze, 2025; Stoica & Barbu, 2025). This is largely attributable to biological maturation, including musculoskeletal growth, hormonal changes, and improved coordination. As (Sun et al., 2025) reported in a study of young elite Chinese footballers, both anthropometric and physiological characteristics significantly vary by age group, indicating that developmental stage strongly influences training outcomes. Similarly, (Fortunato et al., 2024) found that longitudinal improvements in soccer-specific skills were directly linked to gains in motor competence, which tend to accelerate during late childhood. The present findings reinforce these observations, showing that 11–12-year-old boys derived greater benefit from training intensity and complexity than did younger peers, highlighting the need for differentiated program design.

The structure and methodology of the current intervention—progressively increasing intensity from ball control to small-sided games—proved particularly effective. This aligns with studies advocating small-sided or modified game approaches to promote both physiological and cognitive development (Aghdasi et al., 2024; Costa et al., 2024). Such formats foster decision-making, attention, and teamwork while maintaining high energy expenditure and engagement levels (Sendil et al., 2024; Stefanica et al., 2024). In contrast to purely repetitive drills, game-based methods simulate authentic football contexts, which enhance not only physical abilities but also problem-solving and adaptability—key components of motor intelligence (Reinhard et al., 2025; Tokay & Akil, 2025).

The improvement in aerobic endurance in this study can be interpreted as a result of continuous intermittent efforts typical of football play, which develop cardiovascular efficiency and metabolic flexibility (Li et al., 2025; Stamenkovic et al., 2024). These physiological adaptations have been well documented in previous meta-analyses showing that recreational football significantly improves

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cardiorespiratory health and body composition among children and adolescents (Li et al., 2025). Similarly, gains in agility and reaction speed reflect improvements in neuromuscular coordination and sensorimotor integration facilitated by drills involving directional changes, spatial awareness, and rapid response (Basarir et al., 2025; Farley et al., 2024). Over time, such adaptations can enhance proprioceptive accuracy and movement efficiency, key predictors of athletic performance and injury prevention (J. Wang et al., 2025; Y. Wang et al., 2025).

Cognitive and psychological dimensions may also have contributed to the performance gains observed. Studies in sports psychology have shown that training programs that combine physical and cognitive components produce superior outcomes in both domains (Akbar et al., 2025; Reinhard et al., 2025). Football inherently integrates decision-making, attention control, and tactical awareness—skills that are neurologically linked with improved cerebellar-cortical connectivity (Y. Wang et al., 2025). The development of these skills may enhance a child's ability to process feedback, anticipate movement outcomes, and maintain concentration during physically demanding tasks (Tafuri et al., 2025; Tokay & Akil, 2025). Therefore, the improvements in physical and psychological competence seen in this study can be interpreted as a product of both physiological conditioning and cognitive engagement.

The present findings also resonate with educational and social perspectives on sport. Football training offers a platform for building cooperation, responsibility, and emotional regulation (Stefanica et al., 2024). Children participating in structured sports environments develop stronger social bonds and interpersonal skills, which, in turn, reinforce motivation and persistence (Zheng et al., 2025). The multidimensional impact of football training on cognitive, emotional, and social outcomes highlights its value as a holistic educational tool rather than merely an athletic pursuit (Grygus et al., 2024; Rodrigues et al., 2025). This holistic model supports the view that sport-based interventions contribute to both physical literacy and life skills formation, laying the foundation for lifelong engagement in active living (Gallahue & Alsman, 2004; Payne & Isaacs, 2017).

In addition, the results of this research provide valuable insights for practical applications in school-based and community sport programs. The strong relationship between motor competence and perceived competence suggests that physical educators and coaches should emphasize skill mastery and self-referenced progress rather than competition at early stages (Aghdasi et al., 2024; Duncan et al., 2022). Providing supportive feedback and opportunities for success enhances intrinsic motivation and emotional well-being (Sadeghi et al., 2019; Stamenkovic et al., 2024). When properly structured, youth football serves as both a developmental and therapeutic context that nurtures resilience, confidence, and cooperative behavior (Rodrigues et al., 2025; Stefanica et al., 2024).

Overall, the convergence between the present findings and existing literature strongly supports the efficacy of football-based physical education for holistic child development. The study confirmed that participation in a structured eight-week football training program significantly improved both perceived competence and physical fitness indices among boys aged 9–12, with more pronounced effects in older participants. These results substantiate the growing consensus that age-appropriate, game-based, and cognitively engaging sports interventions are essential for optimizing physical and psychological outcomes in childhood (Basarir et al., 2025; Costa et al., 2024; Stoica & Barbu, 2025).

This study, while yielding meaningful findings, has several limitations that should be acknowledged. The relatively small and geographically localized sample limits the generalizability of results to broader populations. Participants were drawn from a single province in Iraq, which may have unique socio-cultural and environmental characteristics influencing motivation and access to sport. The quasi-experimental design, though appropriate for intervention studies in educational contexts, cannot fully control for all extraneous variables such as nutritional habits, extracurricular activities, or parental support. Additionally, the intervention duration of eight weeks, though sufficient to detect measurable change, may not capture long-term adaptation patterns or maintenance effects. Self-reported measures of perceived competence may also be influenced by social desirability bias or individual differences in self-perception.

Future studies should employ larger, more diverse samples to enhance external validity and allow for cross-cultural comparison of developmental trajectories in youth football. Longitudinal research is recommended to examine the persistence of physical and psychological gains over extended periods. Future designs could incorporate neurocognitive assessments, physiological markers, and motion analysis to better elucidate the mechanisms linking motor competence, perception, and neural development. Investigating gender differences, positional roles, and socio-

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emotional variables could also deepen understanding of how individual and contextual factors interact with training effects. Moreover, future research should explore digital and AI-supported interventions that personalize training intensity and feedback while maintaining developmental appropriateness.

From a practical standpoint, the results of this study underscore the importance of implementing structured, progressive, and developmentally tailored football programs in schools and community clubs. Coaches and physical educators should emphasize skill acquisition through small-sided games, cooperative play, and adaptive drills rather than early specialization or excessive competition. Creating supportive environments that encourage autonomy, mastery, and enjoyment can enhance both motivation and long-term adherence to sport. Age-based differentiation in training load and instructional methods should be prioritized to accommodate developmental variability. Integrating football-based physical literacy programs into primary education curricula may offer an effective avenue for improving children's overall health, competence, and psychosocial well-being.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the study and participated in the research with informed consent.

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