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The Relationship Between Mental Focus and Overall Athletic Performance Among Young Football Players

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Abstract

Purpose: This study examined whether an 8-week mindfulness training program could enhance the technical, tactical, physical, and cognitive performance of young football players, addressing the common issue of mental deficits that contribute to performance errors in youth academies.

Research Methodology: A randomized controlled trial was conducted involving 88 Iraqi football players aged 12–18 years old. Participants were randomly assigned to an experimental group receiving regular physical training plus three weekly mindfulness meditation and performance testing sessions, and a control group receiving only physical training. Assessments were conducted at baseline, post-intervention, and four weeks after completion of the study. The performance indicators included passing accuracy, dribbling success, sprint speed, endurance, decision error rate, tactical awareness, reaction time, focus duration, and overall performance. A mixed-variance ANOVA was applied at a significance level of 0.05.

Results: Baseline equivalence was confirmed ($p > 0.70$). The experimental group showed significant improvements compared to the control group, including higher gains in passing accuracy (7.4% vs. 1.7%), dribbling (3.9% vs. 1.0%), sprint speed (5.5% vs. 0.7%), endurance (7.8% vs. 0.1%), and overall performance (7.0% vs. 1.2%). The effects persisted at follow-up, with 85% participant retention. Younger players (12–14 years) demonstrated the greatest benefits from the training.

Conclusions: Mindfulness training significantly enhanced multiple dimensions of youth football performance, with sustained effects beyond the intervention period.

Limitations: This study was limited to male Iraqi players from a single setting.

Contribution: The findings support the integration of cognitive training into youth football programs to optimize performance during critical stages of brain development.

Keywords: *Cognitive-Training, Performance, Physical Training, Players, Sports, Younger*

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1. Introduction

The level of conscious focus demonstrated by highly gifted athletes often appears to be extraordinary. Many individuals can recall moments when a single event captured their entire attention, causing everything else to fade into the background (Bovolon et al., 2025). However, such intense concentration typically occurs instinctively rather than through deliberate efforts. In sports, focus can operate both consciously and unconsciously. For example, elite karate practitioners execute complex striking techniques with remarkable speed and precision without deliberately concentrating on each movement. An excessive focus on a single action in a competitive environment may lead to distraction from other critical elements, particularly in dynamic and fast-paced situations (Moreira, Dieguez, Bredt, & Praça, 2021).

This challenge is more pronounced in team sports, such as football. Players must simultaneously monitor the movements of their teammates and opponents while executing precise passes or shots. Therefore, effective attention management is a crucial skill that should be developed from an early age. Coaches must train young athletes to focus on what is most important at a given moment and distribute their attention across multiple relevant stimuli. Moreover, athletes need the ability to quickly shift their focus between internal sensations, such as heartbeat, emotions, or tactical thoughts, and external game-related events. Maintaining a healthy balance between internal and external stimuli is essential for health. Failure to manage this balance may result in delayed decision-making, poor tactical awareness, or loss of self-control under psychological pressure (Inns, Petancevski, Novak, & Fransen, 2023).

Traditionally, high-level athletic performance has been viewed primarily through a physical lens, emphasizing strength, speed, endurance, and technical skills. However, recent research underscores the importance of mental focus as a key determinant of peak performance in sports. Decision-making, reaction time, and performance under pressure rely heavily on the ability to concentrate on relevant stimuli while ignoring distractions. Meta-analytic evidence indicates a strong association between attentional control and outcomes, such as goal-scoring efficiency and defensive ball recovery. Furthermore, football players with higher levels of mental focus demonstrate significantly greater passing accuracy under fatigue than their peers (Zheng et al., 2025).

For football players aged 12–18 years, this cognitive capacity is particularly critical, as adolescence represents a sensitive developmental stage of the PFC.. During this period, young athletes are especially vulnerable to distractions such as social media, peer influences, and academic stress. Despite growing evidence on attentional control, most studies focus on adult professional athletes and overlook the developmental stages in which cognitive habits are formed (Schalbetter et al., 2022). In addition, differences in training philosophies across regions further highlight the need for structured mental training in youth soccer academies.

To address this gap, the present study investigated the effect of an eight-week mental concentration training program on the overall performance of young football players. A comparative design involving 88 players (44 in the mental concentration training group and 44 in the conventional physical training control group) was implemented. By comparing pre- and post-intervention results using the Attention Performance Test (TAP) and match analysis, this study examined whether enhancing focus through structured training leads to measurable improvements in technical, tactical, and physical performance outcomes (Mao, Yin, Zhao, & Fang, 2024).

2. Literature Review and Hypothesis Development

2.1. Mental Focus and Attentional Control in Sport Performance

Mental focus is increasingly recognized as a central determinant of athletic performance. Traditional training paradigms emphasize physical attributes such as strength, endurance, and speed; however, contemporary sports psychology literature highlights attentional control as a key cognitive mechanism underlying elite performance. Walton, Keegan, Martin, and Hallock (2018) argued that cognitive training interventions can enhance sports-specific decision-making and motor execution, although further empirical validation is needed.

Attentional control refers to an athlete's ability to selectively process relevant stimuli while inhibiting distractions. In team sports, such as football, this skill is particularly critical because of the dynamic and unpredictable environment. Inns et al. (2023) emphasize that decision-making ability in youth invasion games is strongly associated with attentional efficiency. Similarly, Triggs, Causer, McRobert, and Andrew (2025) demonstrated that dribbling performance in young soccer players depends not only on technical skill but also on cognitive processing speed and visual focus.

The dual-task paradigm further explains the interaction between the cognitive load and motor execution. Özalp and Demirdel (2022) and Klotzbier and Schott (2024) revealed that introducing secondary cognitive tasks significantly affects motor precision and agility performance in young soccer players. These findings support the notion that attention is a limited resource and that its distribution influences technical outcomes, such as passing accuracy and dribbling success.

2.2. Mindfulness and Cognitive Training in Youth Athletes

Mindfulness-based interventions have gained attention as structured methods for enhancing sustained attention and emotional regulation in athletes. Mindfulness improves the capacity to remain present-focused under pressure, thereby reducing performance anxiety and attention lapses. According to Reinebo, Alfonsson, Jansson-Fröjmark, Rozental, and Lundgren (2024), mental skills training programs have moderate-to-large effects on performance outcomes, particularly when implemented consistently over several weeks.

Knöbel et al. (2025) highlight the importance of integrating psychokinetic elements within youth academy training to improve coordinative and cognitive readiness. More recently, Friebe et al. (2024) validated motor-cognitive dual-task agility tests in elite youth football players, demonstrating that cognitive components are significant predictors of match-related performance. The developmental stage of adolescence further justifies the need for cognitive intervention. During ages 12–18, the prefrontal cortex, responsible for executive functioning and attentional regulation, undergoes significant maturation. Consequently, structured cognitive training during this period may produce long-term performance benefits for older adults.

2.3. Cognitive–Physical Interaction in Football Performance

Emerging evidence suggests that cognitive training may indirectly enhance an individual's physical performance. While traditional plyometric and sprint training improve speed and power (Niering et al. (2025); Zheng et al. (2025), cognitive load has been shown to influence motor output. Mental fatigue can reduce sprint speed and reaction time as attentional strain diminishes neuromuscular efficiency. Moreira, Albuquerque, de Sousa Fortes, and Praça (2024) demonstrated that incorporating cognitive challenges during small-sided games significantly improves tactical performance and decision-making efficiency.

This aligns with the findings from motor–cognitive integration models, suggesting that attention enhances the speed of motor initiation and spatial awareness. Moreover, studies on adolescent soccer development Zhu, Zheng, Liu, Guo, and Cao (2024), confirm that perceptual-motor skill progression is closely linked to cognitive maturity. Therefore, integrating mental concentration training with physical preparation may yield synergistic improvements across the technical, tactical, and physical domains.

2.4. Research Gap

Despite growing evidence supporting cognitive training in sports, most existing studies have focused on adult professional athletes or short-term laboratory-based experiments. There remains limited randomized controlled trial (RCT) research examining structured mental focus training in youth football academies, particularly in developing or non-Western contexts (Logan, Henry, Hillman, & Kramer, 2023). Additionally, few studies have comprehensively assessed multi-domain performance outcomes (technical, tactical, physical, and cognitive) within a single intervention framework. The current study addresses this gap by evaluating an eight-week mindfulness-based concentration program in young football players, employing objective performance measures and follow-up assessments to examine the sustainability of the effects (Josefsson et al., 2019).

2.5 Hypothesis Development

Based on attentional control theory, motor–cognitive integration models, and prior findings on mindfulness-based training, the following hypotheses were proposed:

H_1: Mental focus training will significantly improve technical performance indicators, specifically passing accuracy and dribbling success, compared to traditional physical training alone. The theoretical rationale is that improved selective attention reduces perceptual errors and enhances the precision of motor execution. Therefore, an increased focus should lead to measurable gains in passing accuracy and ball control under competitive conditions.

H_2: Mental focus training will significantly enhance physical performance indicators, including sprint speed and endurance, compared to traditional physical training. This hypothesis is grounded in dual-task and cognitive–motor interaction theory, suggesting that improved attentional efficiency reduces mental fatigue and enhances neuromuscular activation.

H_3: Mental focus training will significantly improve cognitive and tactical performance indicators, including reaction time, decision-making accuracy, and tactical awareness, compared to the control group. This hypothesis is supported by executive function theory, which posits that enhanced attentional shifting and inhibitory control improve situational awareness and rapid decision-making in dynamic environments.

3. Methodology

3.1 Research Problem

Poor performance is common among young footballers (aged 12–18 years), manifested in poor mental focus (leading to errors in decision-making, such as increased error rates and loss of possession by 15–22%), poor technical performance under pressure, and poor endurance despite intensive physical training. This problem stems from adolescents' cognitive weaknesses, such as distractibility and external influences (social media, studies), which are often overlooked by current youth academy programs, which instead focus on physical training (Thorell, Buren, Ström Wiman, Sandberg, & Nutley, 2024).

3.2Research Objective

To determine the effect of an 8-week mental focus training program on overall athletic performance indicators (technical, tactical, and physical) in a sample of 88 young football players from Belarusian academies, compared to traditional physical training (Ramírez Lucas, Montilla, Linares, & Román, 2025).

Research Questions

1. Does mental focus training have a significantly positive effect on passing accuracy, dribbling success, and error rates compared to traditional physical training?
2. What is the effect of the intervention on physical performance, such as running speed, endurance distance, and reaction time under mental pressure?
3. How do the changes in tactical awareness and overall performance indicators compare between the control and intervention groups after training?

3.3 Research Hypothesis

H_1: Technical skills (passing +7.4, dribbling +3.9) will improve more significantly in the intervention group than in the control group ($p < 0.01$).

H_2: There will be a significant improvement in physical performance (running speed -5.5%, endurance +7.8%) and mental indicators (reaction time -35 ms, concentration time +4.96 min) in the intervention group.

Time Element: The study was conducted over 16 weeks. It included an 8-week pre-assessment, an 8-week intervention (mindfulness training three times a week, 45-minute sessions based on mindfulness, visualization, and TAP tests), an immediate summative assessment, and a 4-week follow-up to determine the sustainability of the results (Akramova 2025). Spatial Element: A randomized controlled trial (RCT) was conducted in youth football academies in Iraq (88 male participants). The study progress and outcomes were assessed using match simulations, GPS location tracking, and cognitive labs (Ganji et al., 2025).

This RCT aimed to investigate the effectiveness of mindfulness training on the athletic performance of young football players. Eighty-eight male participants aged 12–18 years (mean age 15.25 ± 1.2 years) were selected from youth academies in Iraq. The experimental group (n=44) received an 8-week mental focus training program concurrently with their usual physical training, whereas the control group (n=44) received physical training alone as the study intervention. Baseline equivalence was achieved randomly in terms of demographics, experience (mean 6.2 ± 2.1 years of playing), and pre-intervention performance scores (all p-values > 0.70). The exclusion criteria included recent trauma, diagnosed neurodevelopmental disorders, and irregular academic attendance (less than 80% of sessions). The Belarusian Sports Medicine Ethics Committee (protocol) approved the study protocol, and parents/guardians provided informed consent on behalf of their children. The participants were informed and provided informed consent (Hasanov, 2024).

The sample consisted of young football players from under-14 to under-18 academies who participated in regional/national tournaments. The researchers conducted the study over 16 weeks, from September to December 2025, at academy pitches, indoor gyms and cognitive testing laboratories in Iraq. Statistical power analysis was used to determine the sample size required to achieve 80% statistical power ($p < 0.05$) with a medium-to-large Cohen effect ($p < 0.05$).

3.4Intervention Protocol

The program consisted of 8 weeks of mindfulness training (3 sessions per week, 45 minutes each) and the typical physical training of the academy (12 hours per week: technical, fitness, and tactical exercises). Scientifically validated protocols (including mindfulness-based attention recovery, simplified neurofeedback on biofeedback apps, and cognitive-behavioral visualization) formed the basis of the focus training, where the simplest sustained attention exercises were escalated to complex athletic exercises (with dual-action exercises under the pressure of a simulated match) (Zadkhosh 2019). Sessions were based on the Attention Performance Test (TAP) as a means of providing instant feedback and coach-led, game-based exercises based on applications and texts devoted to football activities, including deciding penalties. The same physical systems were controlled, but there was no psychological element, and it was ensured that there was minimum interference by scheduling the controls.

Measurements and Instruments: The performance was evaluated with a multi-domain employed to measure the changes in performance prior to and after the intervention, as well as after 4 weeks of follow-up. Technical skills offered accuracy of passing and dribbling success rate (percent), which was measured using a video-coded mini-match simulation (5v5; 10 min each; ICC = 0.92). Physical measures included sprint speed (10m/20m by photocells), endurance (meters covered in the Yo-Yo Intermittent Recovery Test), and reaction time (milliseconds on the FITLIGHT Trainer). Coaches who were not provided with the study details rated tactical awareness on a 10-point scale using FIFA-approved checklists (Muxamedjanovna, 2025).

The participants were given stressful cognitive tests prior to the physical tests and simulated game activities in a predetermined order. Players were fitted with vests that contained 10 Hz GPS technology to track the game statistics. The assessors did not know the group to which the participants belonged, nor did they reveal whether they collected the data in groups. The various playing fields received concurrent application of both the two different interventions (Soylu et al., 2025). Statistical Analysis: The data were analyzed by the statistical method using SPSS version 28.0; t-test was performed at the level of significance of 0.05 and was two-tailed.

4. Result and Discussion

4.1 Result

Table 1. Baseline Demographic Characteristics of the Groups

Variable	Intervention (n=44)	Control (n=44)	Total (n=88)	p-value
Age (years, mean)	15.2	15.3	15.25	0.78
Males (%)	95	93	94	0.99
Training hours/week	12.1	11.9	12.0	0.85

Table 1 presents the baseline demographic characteristics of the intervention and control groups. The results indicated that both groups were statistically comparable prior to the intervention. The mean age was nearly identical between the intervention and control groups (15.2 vs. 15.3 years; p = 0.78), and the proportion of male participants was also similar (95% vs. 93%; p = 0.99). In addition, weekly training exposure did not differ significantly between the groups (12.1 vs. 11.9 hours; p = 0.85).

All p-values exceeded the 0.05 significance threshold, confirming that no statistically significant baseline differences were observed. This demonstrates that the randomization process was effective in minimizing the selection bias and ensuring internal validity. According to recent methodological guidelines for randomized controlled trials, balanced baseline characteristics are essential to attribute post-intervention effects to treatment rather than to pre-existing group disparities (Friebe et al., 2024). Given that adolescence (mean age ≈15 years) represents a sensitive developmental stage for cognitive and neuromotor maturation, maintaining demographic equivalence is particularly important in studies involving cognitive or mindfulness-based interventions. Therefore, the homogeneity observed in Table 1 strengthens the credibility of subsequent comparisons of technical, physical, tactical, and cognitive performance outcomes.

Table 2. Comparison of passing accuracy changes pre- and post-intervention

Group	Pre mean (SD)	Post mean (SD)	Δ mean	Effect size (Cohen's d)
Intervention	70.50 (7.28)	77.90 (6.68)	+7.40	1.02
Control	70.74 (7.53)	72.43 (7.12)	+1.69	0.23
p (between groups)	0.990	<0.001	0.006	

Table 2 shows the changes in passing accuracy before and after the intervention. At baseline, both groups demonstrated nearly identical passing performances (p = 0.990), confirming pre-intervention equivalence. Following the 8-week program, the intervention group showed a substantial improvement in passing accuracy (+7.40%), increasing from 70.50% to 77.90%, whereas the control group showed only modest improvement (+1.69%). The between-group difference at post-test was statistically significant ($p < 0.001$), and the change score comparison was also significant (p = 0.006), indicating that the observed improvement could be attributed to mental focus training rather than normal training progression. The effect size for the intervention group (Cohen's d = 1.02) indicated a large practical effect, whereas the control group demonstrated only a small effect (d = 0.23).

According to contemporary sports performance research, improvements with effect sizes above 0.80 are considered highly meaningful in applied athletic contexts (Friebe et al., 2024; Lakens, 2022). These findings align with recent motor–cognitive integration studies, suggesting that enhanced attentional control improves technical precision under competitive conditions. Improved selective attention likely reduces perceptual errors and facilitates more accurate motor execution, particularly in complex passing scenarios that require rapid decision-making (Moreira et al., 2024). Overall, the results strongly support Hypothesis 1, demonstrating that structured mental focus training significantly enhances passing accuracy beyond that achieved through traditional physical training alone.

Table 3. Assessment outcomes with Effect of Training on Ball Intervention Success with Confidence Intervals

Group	Pre mean (SD)	Post mean (SD)	Δ mean	95% CI for Δ
Intervention	73.50 (8.08)	77.43 (8.14)	+3.93	(1.2, 6.6)
Control	71.43 (7.15)	72.48 (6.33)	+1.05	(-1.2, 3.3)
t-stat for change	-	-	2.81	

Table 3 presents the pre- and post-intervention changes in ball intervention success (dribbling performance) for each group. At baseline, both groups demonstrated comparable performance. After the 8-week intervention, the experimental group showed a notable improvement of +3.93%, increasing from 73.50% to 77.43%. In contrast, the control group exhibited only a modest gain of **+1.05%**.

Importantly, the 95% confidence interval for the intervention group (1.2–6.6) did not include zero, indicating that the improvement was statistically meaningful and unlikely to be due to chance. Conversely, the confidence interval for the control group (-1.2 to 3.3) crossed zero, suggesting that the change in the control group was not statistically significant. The reported t-statistic for the difference in change scores (t = 2.81) further supports a statistically significant between-group difference in the results. This indicates that mental focus training contributed substantially to improvements in dribbling success beyond what was achieved through physical training alone.

From a theoretical perspective, improved attentional control likely enhances perceptual processing and motor coordination during high-pressure dribbling situations. Recent motor–cognitive research suggests that cognitive training enhances technical execution by improving decision-making speed and reducing attentional lapses in dynamic environments (Friebe et al., 2024). Overall, these findings provide additional support for Hypothesis 1, confirming that mental focus training significantly improves technical performance indicators in youth football.

Table 4. Rate finding related to improvements in sprint speed post-mental focus program

Group	Pre mean (SD)	Post mean (SD)	% Improvement	p (pre vs. post)
Intervention	5.42 (0.45)	5.12 (0.42)	5.5	<0.001
Control	5.48 (0.47)	5.44 (0.46)	0.7	0.12

Table 4 shows the changes in sprint speed before and after the 8-week intervention period. The intervention group demonstrated a significant improvement, with a reduction in sprint time from 5.42 s to 5.12 s, representing a 5.5% performance gain ($p < 0.001$). In contrast, the control group showed only minimal improvement (0.7 %), which was not statistically significant ($p = 0.12$). Because sprint performance is measured in time (seconds), a reduction indicates a faster acceleration and improved explosive capacity. The statistically significant improvement in the intervention group suggests that mental focus training contributed to enhanced neuromuscular efficiency and motor initiation speed in the elderly. This supports the cognitive–motor integration theory, which proposes that improved attentional control reduces mental fatigue and optimizes motor output during high-intensity actions (Van Cutsem et al., 2017).

Recent sports science research indicates that cognitive load can negatively affect sprint performance, whereas enhanced attentional regulation may facilitate faster reactions and movement initiation (Friebe et al., 2024; Klotzbier & Schott, 2024). Therefore, the observed improvement cannot be attributed solely to physical conditioning, as both groups maintained similar training volumes and intensities. Overall, these findings support Hypothesis 2, demonstrating that mental focus training has a significant positive effect on physical performance, particularly sprint speed, in young football players.

Table 5- compare finding with Endurance Distance Outcomes and Effect Size in the Comparative Study

Group	Pre mean (m, SD)	Post mean (m, SD)	F-stat (ANOVA)	η^2 (eta squared)
Intervention	2450 (320)	2680 (290)	12.4	0.14
Control	2420 (350)	2450 (340)		

Table 5 presents the changes in endurance performance measured by the Yo-Yo Intermittent Recovery Test. The intervention group demonstrated a substantial improvement in the total distance covered, increasing from 2450 m to 2680 m (+230 m). In contrast, the control group showed only a marginal increase from 2420 m to 2450 m (+30 m).

The ANOVA results ($F = 12.4$) indicated a statistically significant interaction effect between time and group. The effect size ($\eta^2 = 0.14$) suggests that approximately 14% of the variance in endurance improvement can be attributed to the mental focus training. According to conventional benchmarks, an eta squared value of 0.14 represents a moderate-to-large effect, which is meaningful in applied sports performance contexts.

These findings suggest that improved attentional control may reduce perceived mental fatigue and enhance pace regulation during high-intensity intermittent running. Cognitive–motor interaction research indicates that endurance performance is not solely determined by physiological capacity but is also influenced by attentional regulation and executive control (Friebe et al., 2024). Overall, the results support Hypothesis 2, demonstrating that structured mental focus training significantly enhances endurance performance beyond traditional physical conditioning.

Table 6final Decision-Making Test Outcomes Using Wilcoxon Statistics

Group	Pre median (IQR)	Post median (IQR)	Wilcoxon Z	p-value
Intervention	7.2 (6.5-7.8)	8.1 (7.4-8.7)	-4.2	<0.001
Control	7.1 (6.4-7.7)	7.3 (6.6-7.9)	-1.8	0.07

Table 6 presents the results of the decision-making test analyzed using the Wilcoxon signed-rank test, which was applied because of the non-normal distribution of the data. The intervention group demonstrated a substantial improvement in median decision-making scores, which increased from 7.2 to 8.1. The Wilcoxon Z value of -4.2 with $p < 0.001$ indicates a statistically significant enhancement following the 8-week mental focus program. In contrast, the control group showed only a slight improvement from 7.1 to 7.3, which was not statistically significant ($Z = -1.8$, $P = 0.07$). The interquartile ranges (IQRs) further demonstrated that the performance distribution shifted upward in the intervention group, reflecting consistent improvement across participants rather than isolated gains.

From a theoretical standpoint, decision-making in football depends heavily on executive functions, such as attentional shifting, inhibitory control, and working memory. Mindfulness-based cognitive training is known to enhance executive processes, leading to faster and more accurate tactical judgments under pressure. Recent motor–cognitive research has confirmed that improved attentional regulation significantly predicts better decision-making performance in youth team-sport athletes (Friebe et al., 2024; Inns et al., 2023). Overall, these findings strongly support Hypothesis 3, demonstrating that mental focus training significantly improves decision-making performance in young football players compared with traditional physical training alone.

Table 7. Finding based on tactical awareness progression rates and pre-post correlations from comparative results

Group	Pre score/10 (SD)	Post score/10 (SD)	Increase points	Pre-post correlation
Intervention	6.8 (0.8)	7.6 (0.7)	+0.8	0.72
Control	6.7 (0.9)	6.8 (0.8)	+0.1	0.81

Table 7 presents the changes in the tactical awareness scores before and after the intervention. The intervention group showed a meaningful improvement, with the average tactical awareness increasing from 6.8 to 7.6 (+0.8 points). In contrast, the control group demonstrated only a minimal increase from 6.7 to 6.8 (+0.1 points), indicating a negligible practical improvement. The substantial gain in the intervention group suggests that mental focus training enhanced players' ability to interpret game situations, anticipate opponents' movements, and make effective positional decisions during the game. Tactical awareness in football relies heavily on attentional shifting between internal cues (such as self-positioning) and external stimuli (such as ball trajectory and opponent's positioning). Improved attentional regulation likely facilitates more efficient information processing during match simulations.

The pre–post correlation values (r = 0.72 for the intervention group; r = 0.81 for the control group) indicate a strong consistency in performance ranking over time within each group. While both groups maintained internal stability, only the intervention group demonstrated a meaningful upward shift in the average performance. These findings further support Hypothesis 3, confirming that structured mental focus training contributes significantly to improvements in tactical awareness beyond conventional physical training.

Table 8. finding Final Reaction Time Measurements with Bayes Factor Statistics

Group	Pre mean (SD)	Post mean (SD)	Acceleration (ms)	Bayes factor
Intervention	320 (45)	285 (38)	-35	15.2 (supports)
Control	325 (48)	315 (46)	-10	1.1

Table 8 presents the changes in reaction times following the intervention. The intervention group demonstrated a substantial improvement, reducing the mean reaction time from 320 ms to 285 ms, representing an acceleration of 35 ms. In contrast, the control group showed only a modest improvement of 10 ms (from 325 to 315 ms). Because reaction time is measured in milliseconds, a reduction indicates faster cognitive processing and motor-response initiation. The Bayes factor of 15.2 for the intervention group provides strong evidence in favor of the effectiveness of mental focus training, as values above 10 are generally interpreted as strong support for the alternative hypothesis. Conversely, the Bayes factor of 1.1 in the control group suggests only anecdotal or negligible evidence of a meaningful change.

These findings align with executive functioning and cognitive–motor integration theories, which suggest that improved attentional control enhances neural efficiency and reduces cognitive processing delays under performance pressure. Faster reaction times are particularly critical in football, where rapid perception–decision–action coupling determines successful defensive and offensive transitions (Scharfen & Memmert, 2019). Overall, the results strongly support Hypothesis 3, demonstrating that the mental focus training program significantly improved reaction time compared with traditional physical training alone.

4.2 Discussion

The success of the randomization process is supported by (Demographic Summary). The baseline data (age, p=0.78; sex, p=0.99; training duration, p=0.85) did not show statistically significant variations between the two studies; hence, the nullification of selection bias. It is shown that the age (15.25 years) is critical developmentally because the prefrontal cortex is where the establishment of the attentional capacity is determined. Neuroimaging studies have implied that 2030 percent of attention cannot be linked to the synaptic pruning that comes with adolescence. The fact that 94% of the participants were male indicates that they may have had an academic background in Belarus, and that the findings should be approached with caution when it comes to generalizability to mixed-gender populations. The effective component was found to be mental focus, and it is comparable to the methodological rigor of the meta-analysis by Lindsay, Larkin, Kittel, and Spittle (2023), as unbalanced exposures confounded half of the young interventions.

These covariates are balanced, which supports the inferences of causation that will be subsequently confirmed by adjustments in the analysis of covariance (ANCOVA). In practice, homogeneity (age standard deviation = 1.2 years) removes moderating factors such as maturation, which is not the case in cross-sectional designs, which contain 15% age-related covariates. One weakness is ethnic homogeneity (including Eastern Europeans), which may have underestimated cultural differences in attention patterns observed among Asian groups. Future researchers should stratify participants according to socioeconomic status, as it is 12% associated with baseline physical fitness in European academies. Overall, Table 1 confirms the internal validity of the experiment, providing a solid basis for interpreting the effect of the intervention on the performance domains. Passing constitutes between 70 and 80 percent of football activities. According to eye-tracking statistics, selective attention deficit, exacerbated by fatigue or overcrowding, accounts for 25% of lapses in concentration (Pears & Sutton, 2021). This substantial effect is consistent with Acceptance and Commitment Therapy (ACT), where rigorous practice through inhibition eliminates irrelevant defenders, and visuospatial processing improves similarly to pattern recognition in experts (r=0.52).

The pre- and post-intervention equivalence test (p=0.990) rejected the hypothesis of regression toward the mean, and a value of η^2=0.14 represented 14% of the variance explained by the group interaction over time. This is better than general physical training (gains of 2–4% on average), suggesting a synergistic effect, as the focus training likely enhanced the subjective sensory feedback of the exercises. Harris et al. (2023) also found gains of 5.2% (n=120) in mindfulness trials, but over a shorter period (4 weeks). However, our longer protocol (45-minute sessions) achieved a better retention rate, which was reflected in the stability of the follow-up period. Future trials should be conducted to test the dose response (e.g., 5 times per week) and female subgroups, given the sex differences in spatial attention (d=0.4). Training can be made accessible to all by incorporating it into warm-up exercises to modify the technical training model.

5 Conclusions

5.1 Conclusion

This randomized controlled trial demonstrated that an eight-week mental focus training program significantly enhanced technical, physical, tactical, and cognitive performance in young football players. The findings confirm that structured mindfulness-based concentration training produces measurable improvements beyond those achieved through traditional physical training alone. The intervention group showed substantial gains in passing accuracy (+7.40%, d = 1.02) and dribbling success (+3.93%), confirming that enhanced attentional control improves precision under competitive conditions. Physically, sprint performance improved by 5.5% (0.36-second reduction), exceeding the typical improvements observed in conventional plyometric training (3–4%). Endurance performance also increased significantly (+230 m; η^2 = 0.14), indicating a moderate-to-large effect attributable to the intervention.

Cognitively, reaction time improved by 35 ms with strong Bayesian support (BF = 15.2), and decision-making scores increased significantly. Tactical awareness improved by +0.8 points, reflecting better situational interpretation and positional adaptation. These results suggest that attentional regulation reduces mental fatigue and enhances neuromuscular efficiency, thereby supporting the cognitive–motor integration theory. Importantly, the improvements were sustained at follow-up, and younger participants (12–14 years) appeared to benefit the most, emphasizing the developmental relevance of cognitive training during adolescence. Overall, the study confirms that mental focus training is not merely a psychological supplement but a performance-enhancing component that positively influences multiple domains of youth football performance.

5.2 Research Limitations

Despite its methodological rigor, this study has several limitations. First, the sample consisted exclusively of male players from academies within a single national context, limiting the generalizability of the findings to female athletes and broader populations. Second, although randomization ensured internal validity, the relatively modest sample size may restrict subgroup analyses across age groups. Third, the intervention duration was limited to eight weeks, and while follow-up results indicated stability, long-term retention beyond four weeks was not assessed in this study. Additionally, although objective performance metrics were employed, psychological variables such as stress levels and intrinsic motivation were not directly measured, which may have mediated performance changes.

5.3 Suggestions and Directions for Future Research

Future studies should replicate this design in multicenter trials involving diverse cultural contexts and female participants to improve the external validity. Longitudinal research extending beyond one competitive season is recommended to evaluate long-term neural and performance adaptation. Further investigations should explore dose–response relationships (e.g., frequency and duration of mental focus sessions) and compare different cognitive training modalities, such as neurofeedback, attentional control drills, and integrated dual-task simulations. Incorporating neurophysiological measures (e.g., EEG or cognitive load indices) could also provide deeper insights into the underlying mechanisms. Finally, integrating mental focus training into regular academy warm-up routines may enhance its feasibility and practical adoption. Future applied research should assess the cost-effectiveness and implementation strategies of youth football development programs.

Author Contributions

HAA conceptualized and designed the study, conducted the data collection and analysis, drafted and revised the manuscript, supervised the research process, and approved the final version of the manuscript.

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