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IMPACT OF CONSTRAINT-LED APPROACH USING SMALL-SIDED GAME ON THE TACTICAL PERFORMANCE OF FOOTBALLERS: A PILOT STUDY

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Abstract:
In modern football, success depends not only on a player's technical and physical skills but also on their capacity for quick decision-making under pressure. The foundation of player development is traditional tactical training, although alternate approaches to improving tactical performance, like Small Sided Games (SSG), are gaining popularity. The aim of this study was to examine the impact of SSG training through Constraint-Led Approach (CLA) on football tactical performance. The study included 24 student-athlete footballers (N=24, ages between 18 and 22 years) divided into two groups (n=12) exposed to four weeks of CLA-SSG training and Traditional tactical training, respectively, thrice a week with a duration of 60-minute sessions. The System of Tactical Assessment in Soccer (FUT-SAT) was used to assess the tactical performance of the subjects based on the fundamental tactical principles(Nunes *et al.*, 2024). The field test was administered (GK + 3 vs 3 + GK) in a field 36 meters long and 27 meters wide with a goalpost having dimensions of 6 meters in length and 2 meters in height. Statistical procedures included descriptive analysis, the Shapiro-Wilk test for normality, and the paired-samples t-test for within-group as well as the independent samples t-test for between-group

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effectiveness. The significance level adopted was $p<0.05$. The results indicated that there was a significant interaction found between time and group; the change in tactical performance over time differed significantly between the two training groups (pre- and post-test scores), in which the CLA-SSG training group showed an increase in mean score (from 39.62 to 42.02), while the Traditional training group showed a slight decrease (44.44 to 44.16) over the same time. Therefore, this pilot study concludes that implementing CLA-SSG training during the training program is significantly effective for the improvement of tactical abilities and game performance of a football player.

Keywords: football; constraint-led approach; small-sided game; tactical performance; tactical principles; game performance

1. Introduction

The importance of perceptual-cognitive abilities in sports and games has been investigated in various studies (Ciro-Cardona *et al.*, 2023), (Schumacher *et al.*, 2020), (Renshaw & Chow, 2019). In many sports, especially in team ball games such as soccer, abilities such as peripheral perception seem to be of special interest (Zwierko, 2008). Soccer players are required to anticipate and react continuously in a changing, relatively unpredictable situation on the field. Cognitive functions might be important to be successful in soccer (Farooque *et al.*, 2023), (Renshaw *et al.*, 2010). Cognitive training is relevant to football (soccer) due to the sport's high cognitive demands. Studies suggest that cognitive skills like attention, executive functions, and perception are linked to success in soccer (Ryu *et al.*, 2013), (Komar *et al.*, 2019). The players must pay attention not only to the movement of the ball, but also to opponents and teammates in their visual field. Nevertheless, the trainability of abilities such as peripheral perception with sport-specific on-field methods remains to be determined (Poltavski & Biberdorf, 2015), (Sullivan *et al.*, 2021), (Liu, 2023).

The Constraint-Led Approach (CLA) designs practice so that abilities develop from the interaction of task, environment, and individual restrictions, instead of replicating a single "ideal" technique (Ando *et al.*, 2001), (Nunes *et al.*, 2024), (Clemente & Sarmento, 2020). It fits within the ecological dynamic's perspective, which holds that learning is non-linear and motivated by perception–action coupling and exploration (Klostermann *et al.*, 2020). Exposes learners to a variety of limitations and issues, which foster adaptability, creativity, decision-making, and resilience (Liu, 2023). Football games with fewer participants on smaller fields are known as small-sided games (SSGs). They are frequently utilized in training because they may simultaneously deal with social inclusion, technical proficiency, tactical behavior, and physical conditioning (Huijgen *et al.*, 2015), (Hill-Haas *et al.*, 2011). According to research, SSGs can be purposefully developed to influence both individual and team tactical behavior by altering numbers, space, regulations, and formations.

A football player's cognitive architecture is radically altered by the incorporation of Small-Sided Games (SSGs) using a Constraint-Led Approach (CLA), which switches training from mindless repetition to Ecological Dynamics (Aguiar *et al.*, 2012). This technique creates Perception-Action Coupling in contemporary football, when players not only "execute" a move but also "attune" to the surroundings due to time and space constraints. Players are compelled to engage in a continuous process of self-organization by changing task restrictions (such as touch limits) or environmental constraints (such as pitch dimensions) (Bujalance-Moreno *et al.*, 2019). Instead of adhering to strict, pre-planned instructions, athletes learn to recognize "affordances", specific possibilities for action, such a passing lane that only exists for a split second (Reigal *et al.*, 2019). This leads to the development of a high degree of tactical intelligence. Additionally, this training setting functions as a high-intensity laboratory for Executive Functions, which are the cornerstone of superior tactical performance. Because SSGs are chaotic and representative, players' working memory, inhibitory control, and cognitive flexibility are put to the test. Players become active "problem solvers" who can switch between attacking and defensive attitudes quickly rather than being passive recipients of coaching. Players don't just know what to do; they also comprehend when and why to do it based on the changing cues of the match, thanks to this cognitive load, which guarantees that decision-making becomes effective and flexible. In the end, this strategy closes the gap between physical performance and the "mental speed" needed to win the modern game.

Although previous studies have demonstrated the benefits of SSGs for improving physical fitness, technical skills, and decision-making abilities, limited empirical evidence exists regarding their specific influence on overall tactical performance when implemented through a Constraint-Led Approach. Furthermore, most available research has focused on isolated performance indicators rather than examining how CLA-based SSG interventions contribute to the development of tactical intelligence, adaptability, and game understanding in football players.

Given the increasing cognitive and tactical demands of modern football, there is a need to investigate training methods that effectively enhance players' tactical behaviour in realistic game contexts. Therefore, this pilot study was undertaken to examine the impact of a Constraint-Led Approach using Small-Sided Games on the tactical performance of footballers. The findings may provide valuable insights for coaches, physical educators, and sport scientists in designing evidence-based training programs that promote tactical development and improve overall game performance.

2. Methods

2.1 Design

This paper presents a quasi-experimental study with a two-group, pre-test/post-test framework. In which there is a comparison between the impact of cognitive on-field training and traditional tactical training on the performance of student-athlete football

players after a four-week training period, and it examines whether implementing in-field cognitive training is more effective than traditional tactical training.

2.2 Participants

The sample consisted of 24 male collegiate-level student-athlete football players (age = 17 years to 22 years). The participants were selected from the Lakshmibai National Institute of Physical Education, N.E.R.C. Guwahati, and were randomly distributed into two different training groups, each group consisting of 12 footballers. One group received CLA-SSG training, and the other group received traditional tactical training for four weeks. The players performed 158 tactical actions during the pretest assessment and 166 tactical actions after the training period during the post-test assessment. The current study was conducted at the institute's football field with the approval of the concerned administration.

2.3 Instrument

The instrument used to assess players' tactical performance was the System of Tactical Assessment in Soccer— "FUT-SAT" (Teoldo *et al.*, 2011). Recent studies using this system presented values of reliability higher than 0.81 for analysis of tactical actions (Gonçalves *et al.*, 2017; Gonzaga *et al.*, 2014; Padilha *et al.*, 2017). This assessment tool comprises ten core tactical principles, of which five are offensive, i.e., penetration, offensive coverage, depth mobility, width and length, and offensive unity, and five of them are defensive principles, i.e., delay, defensive coverage, balance, concentration, and defensive unity (da Costa *et al.*, 2011, 2009) (see Chart 1).

The FUT-SAT was validated for content validity, construct validity, and observational reliability with moderate consistency using a minimum Kappa index of 0.79 to 0.99. (Costa *et al.*, 2011). The FUT-SAT's protocol comprises three procedures. The first consists of the analysis of actions performed by players during a game, whereas ball possession is considered a unit of analysis to distinguish between defensive and offensive phases. The second procedure refers to the assessment, classification, and recording of tactical actions based on spatial references of the field. The third and last procedure refers to the calculation of variables included in the category Tactical Performance Index (TPI), which includes Performance of the Principle (PP), Quality of Principle Performance (QP), Place of Action in the Game Field (PA), and Action Outcome (AO). Variable weighting values used in the TPIs calculations are shown in Chart 2. The TPI (Tactical Performance Index) was calculated with the following formula:

$$TPI = \Sigma\ tactical\ actions\ \frac{(PP \times QP \times PA \times AO)}{number\ of\ tactical\ actions}$$

Chart 1: Definitions, Categories, and subcategories of variables assessed by FUT-SAT (Zhu *et al.*, 2024)

Categories	Subcategories	Variables	Definitions
Tactical Principles	Offensive	Penetration	Movement of the player with the ball towards the goal line.
		Offensive Coverage	Offensive support to the player with the ball.
		Depth Mobility	Movement of players between the last defender and the goal line.
		Width and Length	Movement of players to extend and use the effective play-space.
		Offensive Unity	Movement of the last line of defenders towards the offensive midfield, in order to support the offensive actions of teammates.
	Defensive	Delay	Actions to slow down the opponent's attempt to move forward with the ball.
		Defensive Coverage	Positioning of off-ball defenders behind the "delay" player, providing defensive support.
		Balance	Positioning of off-ball defenders in reaction to the movements of attackers, trying to achieve the numerical stability or superiority in the opposition relationship.
		Concentration	Positioning of off-ball defenders to occupy vital spaces and protect the scoring area.
		Defensive Unity	Positioning of off-ball defenders to reduce the effective play-space of the opponents.

Chart 2: Components and values considered for the calculation of the Tactical Performance Index (TPI)

Components	Values	Components	Values
1. Performance of the principle (PP)			
Offensive		**Defensive**	
Penetration	1	Delay	1
Offensive Coverage	0.8	Defensive Coverage	0.8
Depth Mobility	0.6	Balance	0.6
Width and Length	0.7	Concentration	0.8
Offensive Unity	0.7	Defensive Unity	0.7
2. Quality of Principle Performance (QP)			
Successful	10		
Unsuccessful	5		
3. Place of Action in the Game Field (PA)			
Offensive Midfield		**Defensive Midfield**	
Offensive Tactical Actions	2	Defensive Tactical Actions	2
Defensive Tactical Actions	1	Offensive Tactical Actions	1
4. Action Outcome (AO)			
Offensive		Defensive	
Shoot at goal	5	Regain ball possession	5
Keep possession of the ball	4	Earn a foul, win a corner or throw-in	4

Earn a foul, win a corner or throw-in	3	Commit a foul, give away a corner or throw-in	3
Commit a foul, give away a corner, or throw-in	2	Ball possession of the opponent	2
Loss of ball possession	1	Take a shot at your own goal	1

2.4 Data Collection Procedure

The subjects were informed and signed consent forms five days prior to the administration of the study. The FUT-SAT field test was administered (GK + 3 vs 3 + GK) in a field 36 meters long and 27 meters wide with a goalpost having dimensions of 6 meters in length and 2 meters in height (see Figure 1). Before the start of the test, players completed 20 minutes of warm-up, both static and dynamic, including general and specific warm-ups. The duration of each game (SSG) was 4 minutes, applying all the official laws of the game. After each goal, the ball was to be restarted by the goalkeeper who received it, not from the midfield (González-Víllora and Da Costa, 2015). The subjects were randomly divided into four groups of six (3 + 3), after which a total of four SSGs were conducted. To distinguish the players between the two teams, they wore different colored bibs (red and yellow).

To record the SSGs, an iPhone 15 (48 MP, f/1.9 wide, 12 MP, f/2.4 ultra-wide) was used. Video footage was recorded in 4K Ultra HD (3840 x 2160 resolution) in .MOV digital format, which was then moved to Acer Chromebook Plus 514 (i3 13th Gen) via USB cable to analyze the players' tactical behavior by playing footage in Nova Video Player (Version: 6.3.28-20250202.1933).

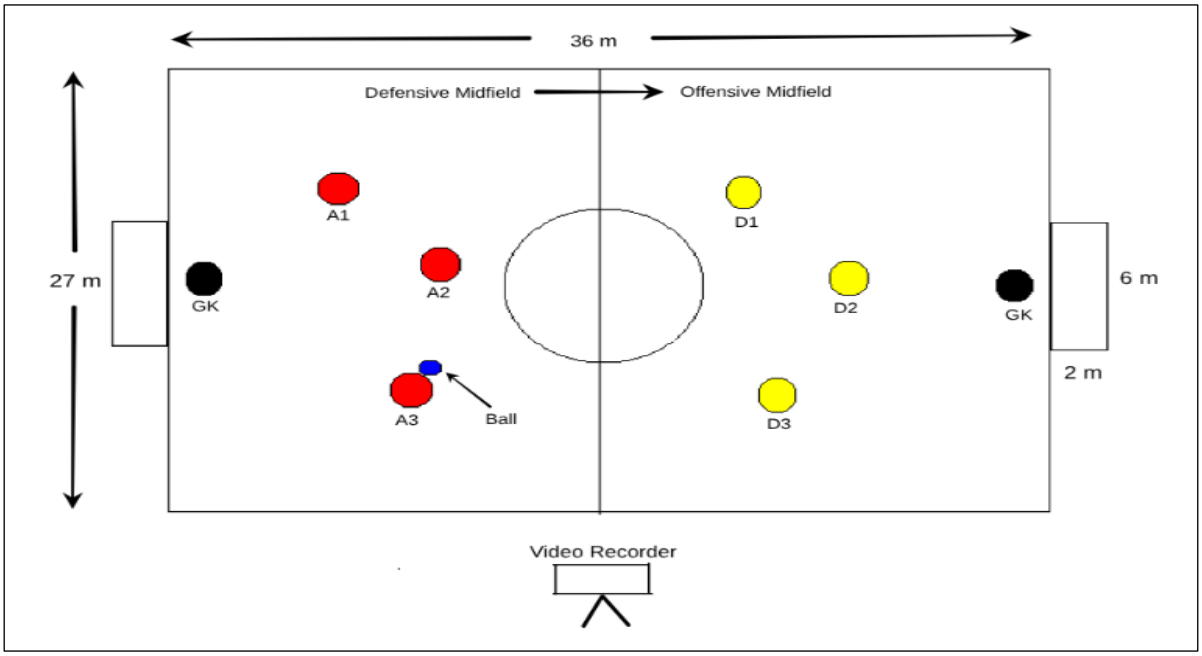

Figure 1: Illustration of the physical structure of FUT-SAT tactical assessment (GK + 3 v 3 + GK)

3. Results

3.1 Analysis of Within-Group Performance

Descriptive statistics for the CLA-SSG training group indicated an increase in the mean performance score from the pre-test to the post-test. The mean pre-test score was 39.6192, which increased to a mean post-test score of 42.015. The standard deviation for the pre-test was 14.8839, while the post-test standard deviation was 12.70504, suggesting a slight reduction in score variability following the training (see Table 1). On the other hand, the traditional tactical training group showed a small change in the mean score from pre-test to post-test. The pre-test mean was 44.4375, which slightly decreased to 44.1533 on the post-test, suggesting no effect on the performance (see Table 2).

Prior to conducting a paired samples t-test, the data for both time points were assessed for normality to ensure the validity of the parametric analysis. The Shapiro-Wilk test was used for this purpose, which is generally more reliable for smaller sample sizes, and showed a significance value of 0.28 for the pre-test and 0.264 for the post-test for the cognitive training group (see Table 1) and 0.815 for the pre-test and 0.915 for the post-test for the traditional training group (see Table 2). All these values are significantly greater than 0.05, confirming that the data is normally distributed and that the use of a parametric paired samples t-test is appropriate.

The paired samples t-test was conducted for both groups to determine if the observed performance was statistically significant or not. Within the CLA-SSG training group, the analysis revealed a mean difference of 2.39583 between the pre-test and post-test scores. The associated t-statistic was −2.344, with 11 degrees of freedom. The two-tailed significance value was p=0.039. Because this p-value is less than the standard significance threshold of 0.05, it is concluded that the improvement in performance from pre-test to post-test was statistically significant (see Table 3). For the traditional training group, the analysis yielded a mean difference of 0.28417, a t-statistic of 0.518, and a two-tailed significance value of p=0.615. As this p-value is far greater than the 0.05 significance threshold, it is concluded that there was no statistically significant difference in performance between the pre-test and post-test scores (see Table 4).

Table 1: Descriptive statistics of the CLA-SSG Training Group

	N	Mean	Std. Deviation	Shapiro-Wilk Sig.
Pre-test	12	39.6192	14.8839	0.28
Post-test	12	42.015	12.70504	0.264

Table 2: Descriptive statistics of the Traditional Tactical Training Group

	N	Mean	Std. Deviation	Shapiro-Wilk Sig.
Pretest	12	44.4375	12.70235	0.815
Posttest	12	44.1533	11.4325	0.915

Table 3: Paired Samples T-test of the CLA-SSG Training Group

	Mean Difference	Std. Deviation	95% Confidence Interval		t	df	Sig. (2-tailed)
			(Lower)	(Upper)			
Pretest-Posttest	2.39583	3.54085	-4.64558	-0.14608	-2.344	11	0.039

Table 4: Paired Samples T-test of the Traditional Tactical Training Group.

	Mean Difference	Std. Deviation	95% Confidence Interval		t	df	Sig. (2-tailed)
			(Lower)	(Upper)			
Pretest-Posttest	-0.28417	1.89996	-0.92301	1.49134	0.518	11	0.615

3.2 Inter-Group Comparative Analysis

The comparison of the effectiveness of the two training methods was conducted by analyzing the "gain scores" of each participant (post-test score minus pre-test score). The group statistics for the gain scores revealed a substantial disparity between the two training groups. The mean gain score for the CLA-SSG training group was 2.3961, indicating an average positive performance increase for each participant. In contrast, the mean gain score for the traditional tactical training group was -0.2838, signifying a slight average decrease in performance (see Table 5). The results of Levene's Test showed an F-statistic of 3.567 with a significance value of 0.072.

The independent samples t-test was performed to determine if the mean gain score of the CLA-SSG training group was statistically different from that of the traditional training group. The analysis for the equal variances assumed condition yielded a t-statistic of 2.312 with 22 degrees of freedom (df=22). The two-tailed significance value was p=0.031, which is less than the standard 0.05 alpha level; a statistically significant difference in mean gain scores between the two groups was confirmed (see Table 6). The mean difference between the gain scores of the two groups was 2.67991. The 95% confidence interval of this difference was from 0.27553 to 5.08430. The fact that this interval does not contain zero provides strong evidence that the observed difference is not due to random chance and reflects a genuine effect of the training intervention. This finding is the definitive result of the study: it establishes that the CLA-SSG training method is not only effective on its own but is also demonstrably and significantly more effective than the traditional tactical training method.

Table 5: Gain scores of the CLA-SSG Training Group and the Traditional Training Group.

Group	N	Mean Gain	Std. Deviation	Std. Error Mean
SSG Training Group	12	2.3961	3.53918	1.02167
Traditional Tactical Training Group	12	-0.2838	1.89838	0.54802

Table 6: Independent T-test of the mean gain scores in the CLA-SSG Training Group and the Traditional Training Group

	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval	
							(Lower)	(Upper)
Levene's Test	3.567	0.072						
t-test (Equal variances assumed)			2.312	22	0.031	2.67991	0.27553	5.0843

The profile plot (see Figure 1) displays the estimated marginal means of TPI scores across two time points (Time 1 represents pre-test and Time 2 represents post-test) for two different groups: the CLA-SSG training group and the traditional tactical training group. It visually represents the group × time interaction: the change over time is different for each group. The CLA-SSG training group showed a noticeable improvement (increase in score). The traditional training group maintained a higher score overall at both time points compared to the CLA-SSG training group, but their score slightly decreased over time.

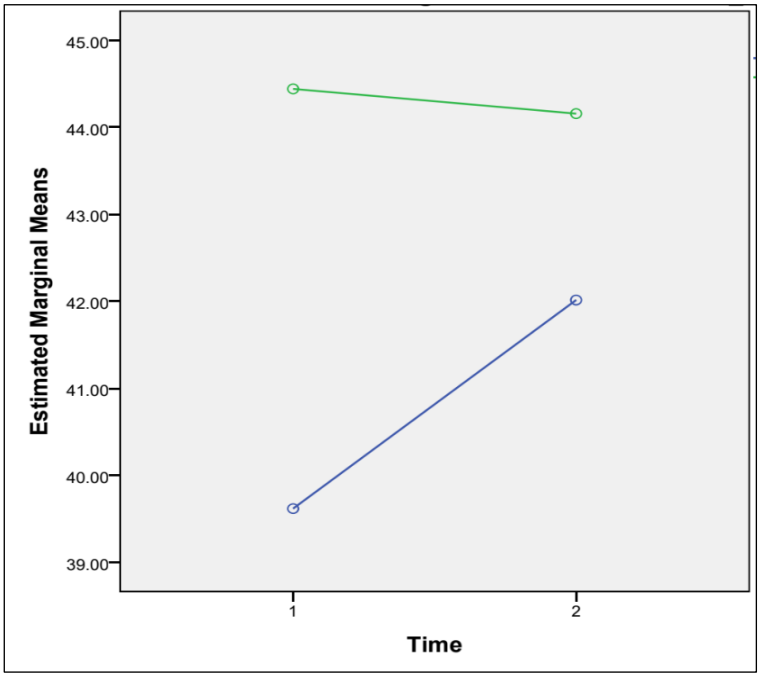

Figure 2: Marginal Means of TPI Scores

Figure 2 represents the estimated marginal means of the dependent variable, i.e., TPI scores, and the x-axis has two points: 1 (pre-test) and 2 (post-test) represent change over time. Lines represent the group variable; the blue line is for the CLA-SSG training group, and the green line is for the traditional tactical training group. The blue line shows a positive slope (upward trend), indicating an increase in the mean score of TPI from Time 1 to Time 2. The green line shows a slightly negative slope (downward trend), indicating a minimal decrease in the mean score of TPI from Time 1 to Time 2.

4. Discussion

The results of this study offer strong support for the idea that implementing CLA-SSG in the training program is better than traditional tactical training at raising the performance parameter under investigation (Scharfen & Memmert, 2021). Based on the statistically significant rise in scores from the pre-test to the post-test, the within-group analysis clearly demonstrated that the CLA-SSG training program successfully generated a significant improvement in performance. The conventional tactical training program, on the other hand, had no discernible impact, and the average performance of that group remained unchanged(Américo *et al.*, 2016).

This conclusion was confirmed by the comparative study of gain scores. A compelling illustration of the relative inefficiency of the conventional strategy in this situation is provided by the notable difference in gain scores between the two groups, with the CLA-SSG group earning a far higher mean increase (Reis *et al.*, 2017). The study offers a concise, evidence-based recommendation for using a CLA-SSG training paradigm for this particular objective. The results imply that training programs should undergo a thorough reassessment in order to give more weight to techniques that specifically target cognitive functions. These findings might support the wise distribution of funds and the purchase of new training tools and initiatives that focus on the improvement of cognitive abilities (Gonçalves *et al.*, 2017).

Even though these results are strong, the study has certain shortcomings. With only 12 individuals in each group, the small sample size is the main limitation. A small sample size may restrict the findings' capacity to be applied to a larger population, even while the analysis's statistical significance is valid for this particular sample. Therefore, the findings of this study should be considered an exploratory yet very promising study. Replication with a bigger, more varied cohort is necessary to boost statistical power and verify that the effects identified are consistent across various skill levels and demographics.

The data can also be used to thoroughly evaluate and mostly reject a potential alternative explanation for the observed discrepancies, such as a "ceiling effect" for the conventional training group (Bach Padilha *et al.*, 2017). The pre-test mean was higher for the traditional tactical training group, but the gain score analysis that followed, which takes this baseline difference into account, revealed a statistically significant difference in favor of the CLA-SSG training group. Despite beginning with a lower baseline, the SSG training group showed a far greater and more significant improvement. This result suggests that there was no ceiling on the performance measure and that the training approach, not the participants' starting skill level, is what caused the variation in results.

5. Conclusion

The main finding of the study was that, in comparison to traditional tactical training, CLA-SSG training is a statistically and practically better way to increase the measured

tactical performance in footballers. Performance significantly improved with the CLA-SSG training program but not with the standard approach. The performance increases of the CLA-SSG group were substantially higher than those of the traditional group, as seen by the comparison of gain scores that followed. These results cast doubt on the ability of conventional training models to improve certain cognitive components of performance and support a change in paradigm toward training approaches that are more intellectually oriented.

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Conflict of Interest Statement
The authors declare no conflicts of interest.

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References

Aguiar, M., Botelho, G., Lago, C., Maças, V., & Sampaio, J. (2012). A Review on the Effects of Soccer Small-Sided Games. *Journal of Human Kinetics*, *33*(2012), 103–113. https://doi.org/10.2478/v10078-012-0049-x

Américo, H. B., Cardoso, F. L., Machado, G. F., Cabral, M. O., Resende, E. R., & Costa, I. T. (2016). Análise do comportamento tático dos jogadores de futebol de categoria de base. *Journal of Physical Education*, *27*(1), 2710. https://doi.org/10.4025/jphyseduc.v27i1.2710

Ando, J., Ono, Y., & Wright, M. J. (2001). Genetic Structure of Spatial and Verbal Working Memory. *Behavior Genetics*, *31*(6), 615–624. https://doi.org/10.1023/A:1013353613591

Bach Padilha, M., Guilherme, J., Serra-Olivares, J., Roca, A., & Teoldo, I. (2017). The influence of floaters on players' tactical behaviour in small-sided and conditioned soccer games. *International Journal of Performance Analysis in Sport*, *17*(5), 721–736. https://doi.org/10.1080/24748668.2017.1390723

Bujalance-Moreno, P., Latorre-Román, P. Á., & García-Pinillos, F. (2019). A systematic review on small-sided games in football players: Acute and chronic adaptations. *Journal of Sports Sciences*, *37*(8), 921–949. https://doi.org/10.1080/02640414.2018.1535821

Ciro-Cardona, J., Marulanda-Tabares, J., Moniz, F., & Valencia-Sánchez, W. (2023). Is the Field Test of FUT-SAT a Better Experimental Design to Identify the Specific Characteristics of Tactical Performance according to Youth Male Soccer Players' Positional Roles? *Journal of Human Kinetics*. https://doi.org/10.5114/jhk/170044

Clemente, F. M., & Sarmento, H. (2020). The effects of small-sided soccer games on technical actions and skills: A systematic review. *Human Movement*, *21*(3), 100–119. https://doi.org/10.5114/hm.2020.93014

Farooque, S., Mitra, M., & Das, P. K. (2023). Effect of Speed Agility, Quickness and Circuit Training on Lipid Profile of Soccer Players: An Observational Study. *Physical Education Theory and Methodology*, *23*(6), 902–908. https://doi.org/10.17309/tmfv.2023.6.12

Gonçalves, B., Esteves, P., Folgado, H., Ric, A., Torrents, C., & Sampaio, J. (2017). Effects of Pitch Area-Restrictions on Tactical Behavior, Physical, and Physiological Performances in Soccer Large-Sided Games. *Journal of Strength and Conditioning Research*, *31*(9), 2398–2408. https://doi.org/10.1519/JSC.0000000000001700

Hill-Haas, S. V., Dawson, B., Impellizzeri, F. M., & Coutts, A. J. (2011). Physiology of Small-Sided Games Training in Football. *Sports Medicine*, *41*(3), 199–220. https://doi.org/10.2165/11539740-000000000-00000

Huijgen, B. C. H., Leemhuis, S., Kok, N. M., Verburgh, L., Oosterlaan, J., Elferink-Gemser, M. T., & Visscher, C. (2015). Cognitive Functions in Elite and Sub-Elite Youth Soccer Players Aged 13 to 17 Years. *PLOS ONE*, *10*(12). https://doi.org/10.1371/journal.pone.0144580

Klostermann, A., Vater, C., Kredel, R., & Hossner, E.-J. (2020). Perception and Action in Sports. On the Functionality of Foveal and Peripheral Vision. *Frontiers in Sports and Active Living*, *1*. https://doi.org/10.3389/fspor.2019.00066

Komar, J., Potdevin, F., Chollet, D., & Seifert, L. (2019). Between exploitation and exploration of motor behaviours: unpacking the constraints-led approach to foster nonlinear learning in physical education. *Physical Education and Sport Pedagogy*, *24*(2), 133–145. https://doi.org/10.1080/17408989.2018.1557133

Liu, C. (2023). A Constraint-Led Approach: Enhancing Skill Acquisition and Performance in Sport and Physical Education Pedagogy. *Studies in Sports Science and Physical Education*, *1*(1), 1–10. https://doi.org/10.56397/SSSPE.2023.06.01

Nunes, N. A., Comber, G., Petiot, G. H., & Coley, M. (2024). Analysis of the internal and external loads, and technical actions of small-sided games in soccer. *Insight - Sports Science*, *6*(1), 638. https://doi.org/10.18282/iss638

Poltavski, D., & Biberdorf, D. (2015). The role of visual perception measures used in sports vision programmes in predicting actual game performance in Division I collegiate hockey players. *Journal of Sports Sciences*, *33*(6), 597–608. https://doi.org/10.1080/02640414.2014.951952

Reigal, R. E., Barrero, S., Martín, I., Morales-Sánchez, V., Juárez-Ruiz de Mier, R., & Hernández-Mendo, A. (2019). Relationships Between Reaction Time, Selective Attention, Physical Activity, and Physical Fitness in Children. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.02278

Reis, M. A. M. dos, Vasconcellos, F. V. do A., & Almeida, M. B. de. (2017). Desempenho e comportamento tático de jogadores de futebol das categorias de base. *Brazilian Journal of Kinanthropometry and Human Performance*, *19*(2), 242. https://doi.org/10.5007/1980-0037.2017v19n2p242

Renshaw, I., Chow, J. Y., Davids, K., & Hammond, J. (2010). A constraints-led perspective to understanding skill acquisition and game play: a basis for integration of motor learning theory and physical education praxis? *Physical Education and Sport Pedagogy*, *15*(2), 117–137. https://doi.org/10.1080/17408980902791586

Renshaw, I., & Chow, J.-Y. (2019). A constraint-led approach to sport and physical education pedagogy. *Physical Education and Sport Pedagogy*, *24*(2), 103–116. https://doi.org/10.1080/17408989.2018.1552676

Ryu, D., Abernethy, B., Mann, D. L., Poolton, J. M., & Gorman, A. D. (2013). The Role of Central and Peripheral Vision in Expert Decision Making. *Perception*, *42*(6), 591–607. https://doi.org/10.1068/p7487

Scharfen, H.-E., & Memmert, D. (2021). Cognitive training in elite soccer players: evidence of narrow, but not broad transfer to visual and executive function. *German Journal of Exercise and Sport Research*, *51*(2), 135–145. https://doi.org/10.1007/s12662-020-00699-y

Schumacher, N., Reer, R., & Braumann, K.-M. (2020). On-Field Perceptual-Cognitive Training Improves Peripheral Reaction in Soccer: A Controlled Trial. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.01948

Sullivan, M. O., Woods, C. T., Vaughan, J., & Davids, K. (2021). Towards a contemporary player learning in development framework for sports practitioners. *International Journal of Sports Science & Coaching*, *16*(5), 1214–1222. https://doi.org/10.1177/17479541211002335

Zhu, R., Zheng, M., Liu, S., Guo, J., & Cao, C. (2024). Effects of Perceptual-Cognitive Training on Anticipation and Decision-Making Skills in Team Sports: A Systematic Review and Meta-Analysis. *Behavioral Sciences*, *14*(10), 919. https://doi.org/10.3390/bs14100919

Zwierko, T. (2008). Differences in Peripheral Perception between Athletes and Nonathletes. *Journal of Human Kinetics*, *19*(2008), 53–62. https://doi.org/10.2478/v10078-008-0004-z