

Original Article

Small-Sided Games configuration pitch and external motor load relationship in young soccer players: narrativeliterature review

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Abstract:

Aim: The Small-Sided Games (SSG) are games with players number, rule, pitch and time modified, used in open skill sport training. In soccer they are identified with the term Small-Sided Games. The literature provides data on the SSG organizational methods in relation to the players number and the pitch size, the use of wildcard players, the recovery times and the recovery mode; but the game space configuration represents a relevant variable especially for the young soccer player who is confronted with situations that are cognitive challenge. This study aims to analyze the research that has described the effects of different spatial configurations in the SSG training session with young soccer players. **Methods:** A systematic search of the PubMed, SPORTDiscus, and Web of Science databases was conducted in September 2019, from January 2000 to August 2019. The keywords used were "small-sided games" or "small-sided soccer games", each one associated with the terms "pitch", "young players", "analysis". The search was not limited based on language; the search was limited based on only age (< 18 years). The studies presenting the keyword "small-sided games" but which referred to other sports than soccer have been deleted. **Results:** The screening (n = 23 studies), allowed to identify 3 articles that were analyzed for the systematic review to describe the effects of different field configurations on the external load during the execution of the SSG with young soccer players. **Conclusion:** The results obtained in this analysis allow to "weight" the technical-tactical exercises with young soccer players. The use of various spatial field configurations could determine a further technical difficulty but certainly imposes a different external load in the young soccer player. The SSG traditional version (ball possession) is the format that allows to obtain the highest values of total achieved distance, of high intensity meters and number of decelerations.

Key words Small-sided games – pitch configuration - young soccer players – external load - GPS

Introduction

In team sports, the technical staff constantly seek a training organization capable of achieving the technical and physical goal, perhaps with a significant involvement of the cognitive aspects: very often, for this reason, they use Small-Sided Games (SSG). The coaches and conditioning specialist coach modify the games executive conditions as to the number of players, the size pitch or the rules in relation to the training session purposes(1). These variations allow the athletes of the various open skill sports to be trained specifically (2). In literature the advantages deriving from the use of SSG for performance are extensively described(3,4,5,6,7): the coaches use the SSGs both with elite soccer players, and with young players(4,5,6) because they optimize the training time (6).

In young soccer player training, the SSGs ensure high-intensity exercise and allow the learning of technical skills (1,7,8). Furthermore, SSGs provide another sought-after feature in youth soccer training: the environment variability in which skills are learned (2,7,9,10). The SSGs have been extensively studied in the literature: however, the study was limited to the internal load and external load analysis (11,12), sometimes to the technical and tactical aspects (13,14) or to the effects of training through SSG (15). An open problem remains the understanding of the executive variants with which SSGs are used in youth football training. The literature provides data on the SSG organizational methods in relation to the players number and the field size (15,16), the use of wildcard players (17,18,19,20), the recovery times and the recovery mode (15, 20); but the game space configuration represents a relevant variable especially for the young soccer player who is confronted with situations that are cognitive challenge (2,7,21,22). Different spatial configurations combined with modified rules create a variability environment that activate problem solving processes during high intensity exercise. But this variability consequently determines different tactical behaviors and different motor loads (23). Some studies have been developed to better understand how spatial constraints, such as field dimensions and spatial references, can influence athletic performance, but these studies have been limited to elite soccer players (1,6,23,24,25,26).

How does the external load vary during the SSG in the young player? Does the external load change or is the space factor modulation irrelevant? This study aims to analyze the research that has described the effects of different spatial configurations on external load parameters in the SSG training session with young soccer players.

Materials and Methods

Electronic databases, including PubMed, ScienceDirect, Web of Science, and SPORTDiscus, were searched for literature dating from January 2000 to August 2019. The keywords used were “small-sided games” or “small-sided soccer games”, each one associated with the terms “pitch”, “young players”, “analysis”. The search was not limited based on publication language; the search was limited based on only age (< 18 years). The studies presenting the keyword “small-sided games” but which referred to other sports than soccer and the abstracts of conference were removed. Results of the search procedures are summarised in Fig.1.

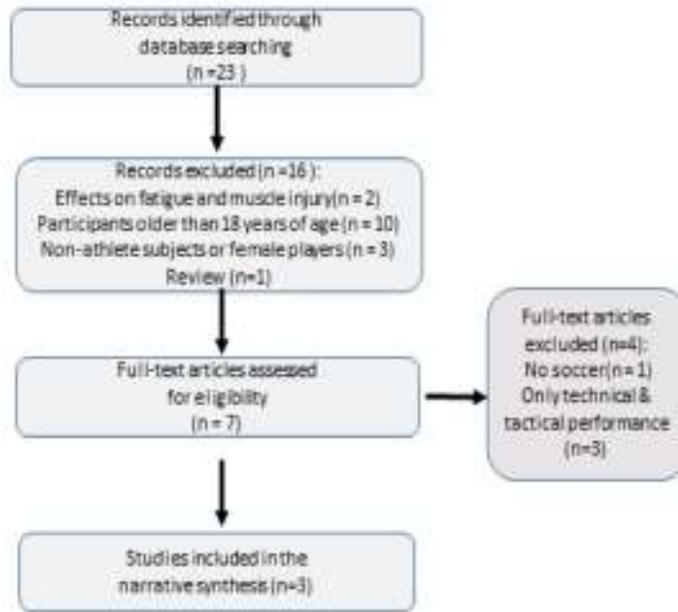


Figure 1. Preferred reporting items for narrative reviews flow diagram

Results

The initial search identified 23 studies in the described databases. The articles were then screened according to the title and full text for relevance, resulting in 16 studies being eliminated (Effects on fatigue and muscle injury, n = 2; participants older than 18 years of age, n = 10; non-athlete subjects or female players, n = 3; review, n=1).

The full texts of the remaining 7 articles were read and another 4 were rejected due to a lack of relevance for the specific purpose of the current study (no soccer, n=1, only technical and tactical performance, n=3)

At the last, the screening procedure, led to identify 3 articles that received further in depth reading and analysis for the systematic review (Tab.1).

Author	Sample	SSG format	Load	Space configuration	Results
Coutinho et al., 2018a	N=12 under 15 (age: 15.9 ± 0.8 y; Height: 172.8 ± 5.2 cm; mass: 59.5 ± 5.2 kg; peak running speed = 23.3 ± 2.8 km.h ⁻¹ ; years of experience = 8.9 ± 2.4 years)	6vs6+ 2GK	3 x 6 min, 3 min passive recovery	64 x 43 m without lines (Control) 64 x 43 m divided into 9 space with lines from 21,3 x 14,3 m (Lines)	Control: ↑ Average speed (p<0.002) ↑ Moderate ratio (p<0.001) ↓ low ratio (p<0.001) Lines: ↑ High ratio (ns)

Coutinho et al., 2018b	N=40 under-13 (age:11.3±0.3, height:152.3±6.9, mass:38.0±9.3) and under-15 (age:13.3±0.6, height:161.4±8.1, mass:55.8±6.9)	5vs5+ 2GK	4x6min, 3 min passive recovery	regular pitch (regular) sided pitch (sided) different orientation pitch (≠orientation) dynamic pitch (dynamic) All pitch 36 x 24 m but for different game, the dynamic condition presented smaller areas (small=700m ² ; diamond shape = 350 m ²)	Under 13: Game Pace(km/h): ↑regular Total Distance Covered(m): ↑regular High Ratio(m/100m): ↑regular Moderate Ratio(m/100m): ↑regular Low Ratio(m/100m): ↑regular Under 15: Game Pace(km/h): ↑regular Total Distance Covered(m): ↑regular High Ratio(m/100m): ↑regular Moderate Ratio(m/100m): ↑regular Low Ratio(m/100m): ↑regular
Sanchez-Sanchez et al., 2019	n=10 age:13.5±0.5 height:164.2±5.8, body mass:58.8±6.2, years of experience:4	5vs5 Field: 37x20m	10 minute	Different game directionality: a) Without directionally (WD), ball possession b) Common directionalit and one GK(CD) c) Free-directionality and two GK (FD) d) Assigned-directionality and two GK (AD)	TD: ↑WD (p<0.01), ↑CD (p<0.05) DEC: : ↑WD (p<0.05) Speed 0.5-3.0 Km/h: ↑FD and ↑AD (p<0.01) Speed 8.1-13.0 Km/h: ↑WD (p<0.05) Speed 13.1-18.0 km/h: ↑WD and CD (p<0.05)

Table 1. Summary of the analyzed literature studies

Discussion

The study aimed to analyze the research that highlighted the effects of different spatial configurations on the use of SSG with young players. So far in literature, the studies have attempted to better understand how spatial constraints, such as field dimensions and spatial references, can influence athletic performance, especially in professional footballers (1,6, 23,24,25,26,27).

Many studies have investigated the internal and external load issue in young players by referring only to the size pitch (7,8,24) and only rarely to the possibility of using / varying space (28). In open skill sports, the space represents the variable that most influences decision-making and athletic performance.

The number of studies investigating the physical impact of using different pitch configuration in youth soccer is low.

The analyzed studies do not allow a comparison because they used and measured different external load parameters and different SSG formats. However, they help to understand how is important the "pitch configuration" factor in the SSG performance.

The three studies analyzed, however, underline how in the same age group, the choice to use different space configurations, determine different performances in the high, moderate and low intensity exercise (22, 29,30).

In the first analyzed study, it is evident that the use of spatial references (lines on the pitch) modified the information that sustained the players' behaviours: according to some authors, in fact, the players positioning is a

consequence from the perceived opportunities for action and the way of how individuals make use of the available information (31,32).

The condition "with lines" therefore seems to also influence the intensity of the exercise (22).

The second analyzed study examines the effects of different spatial orientations of the field, both in static and dynamic form and has highlighted that players exhibited better performances in pitches that are more representative of the environmental information seen during competitive matches that are regular and \neq orientation (29).

The dynamic space modulation in which the exercise is performed seems to strongly influence high intensity exercise with a reduction of about 48% and about 39.6%, respectively for U13 and U15. Also the total achieved distance decreases in the dynamic condition for U13 and U15, respectively of 16.5% and 13.6%.

The third analyzed study examines the effects of different directionality assigned to the game on the external load in youth football. This study examines an executive variant used very often in youth soccer; before this study these execution variants could be used indifferently by the staff because the differences were not known.

In particular, the management, employment and use of space in the young player is a relevant factor for technical and tactical performance and seems to affect the external load factors. The SSG traditional version (ball possession) is the format that allows to obtain the highest values of total achieved distance, of high intensity meters and number of decelerations. The presence of 1 or 2 goalkeepers reduces these values, as happens in the adult and elite soccer players (1,6,15,24).

Conclusion and practical applications

The study allowed to identify the different effects on the external load deriving from a playing field spatial configuration young soccer players.

In some cases it may be necessary to assume an additional training to reach the functional levels imposed by the young soccer model competition.

Conflicts of interest

The author of the following article has not received any funding and have no contractual relationship with the companies that produce the products mentioned in the text.

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