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Insights into the application of soccer-specific actions in established and new game forms of youth soccer

Introduction

We all know that youth soccer scenario when 14 players at the age of seven are on the pitch, each one trying to get the ball and score at the end. The first observation is that at such an age, the players usually move around in a crowd on the pitch around the ball. The second observation is that in dependence on the coach's instructions, a few players seem uninterested and keep clear of the ball until the ball enters their area of responsibility. In both cases, the young learners wishing to develop their soccer-specific skills and tactics get fewer ball contacts and are less involved in the game. The present study compares two different match play models (new game form of 3 vs. 3 and the established game forms of 7 vs. 7 and 6 vs. 6) with each other to test if the level of involvement of young learners in the match plays can be increased to practice skills.

Coaches invest a lot of time to improve children's skills in passing, dribbling, and shooting (Russell & Kingsley, 2011). During constant skill acquisition phases, it seems necessary to keep children's motivation as high as possible, especially if they have experienced a few defeats in a row. Psychologically, success experiences (like scoring in soccer) are one of the most important aspects in order to inspire children for sports such as soccer (Passer, 1981). Participation in a game with fewer players is significantly higher (Jones & Drust, 2007). Consequently, children have more opportunities to

succeed. Small-sided games (SSG) challenge the early learner, because they offer several opportunities for making various simple and complex decisions in the interaction with their peers in team settings (Gabbett, Jenkins, & Abernethy, 2009; Hill-Haas, Dawson, Impellizzeri, & Coutts, 2011; Owen, Twist, & Ford, 2004). Thus, invasion games such as soccer provide high levels of activity to foster multiple learning outcomes at the cognitive, psychomotor, and affective level (Mitchell, Oslin, & Griffin, 2013). Mitchell (2005) postulated that children at the elementary level are able to link their skill acquisition in training to skill application in game situations. The more time young learners are directly involved in game situations, the more enjoyable and motivational experience they have. Thus, young learners practice their skills sustainably. Moreover, García-Angulo, Palao, Giménez-Egido, García-Angulo, and Ortega-Toro (2020b) found that a reduction in the number of players and field size in U12 soccer leads to greater progress in players' and teams' development, whereas soccer-specific self-efficacy remains constant throughout both game forms (García-Angulo, Ortega-Toro, Giménez-Egido, García-Angulo, & Palao, 2020a).

The new game form is one of the well-known soccer game forms claiming that motivational aspects are high, and demanding constraints keep players focused on soccer-specific aspects of the game (i.e., technical and tactical demands). One of the 3 vs. 3 forms called

Funiño was invented by Wein (2004b) and is applied in this study. Teams play 3-a-side on two goals with a field size of 25 m by 38 m (Wein, 2004b). This form allows the players to be more involved in the game and, thus, experience more soccer-relevant technical and tactical skills. By this, a player will be described as "game intelligent" when he has acquired useful tactical habits, even at younger ages. "The more [soccer-specific] knowledge the youngsters acquires, the better" (Wein, 2004a, p. 2). The players are able to get their first hands-on experience of when and how to use technical skills. They also become aware of technical skills that are needed to be developed to act consciously in the game.

The approach of Funiño exposes the players to a series of technical and tactical SSG (e.g., 3 vs. 1, 2 vs. 1, 3 vs. 2) to confront them with different soccer-specific problems not only in isolated dribbling, passing, or shooting drills. For a player it is important to recognize the contextual meaning of a situation within the game. Thereby, young players are able to transfer their learned skills for a substantial solution to a match situation.

Compared to the established game forms, SSG are characterized by a greater number and variability of technical-tactical actions in order to solve constantly changing offensive and defensive problems (García-Angulo et al., 2020b).

It can be assumed that game forms which promote young players' cognitive abilities and behavioral skills will be more

Fig. 1 ◀ Relative game events per minute in the game forms. The game events (passing, dribbling, shooting, and scoring) are displayed for the game forms. The error bars present 95% confidence intervals. The asterisks indicate the significance level (i.e.; * $p < .05$; ** $p < .01$, and *** $p < .001$)

effective with regard to the development of specific soccer skills.

From 6 years on, the young players in Germany have to play 7 vs. 7 or 6 vs. 6 (depending on the federal soccer association) and at the age of 13 to 14 they switch to the normal soccer pitch with 11 vs. 11 players. U7 teams in the regional associations in Germany play on a smaller soccer pitch (e.g., 35 m by 55 m) in a league system usually separated by the quartiles in which they are born. Each team has to defend one goal sized 2 by 5 m, and they play two intervals of 20 min or tournaments with a couple of games of 10 min each.

Physiological responses (e.g., heart rate, blood lactate concentration, covered distance, rating of perceived exertion) as well as technical and tactical skills (e.g., modified by size of the pitch, number of players, and rules of the game) are studied extensively in training forms of SSG (Aguiar, Botelho, Lago, Maças, & Sampaio, 2012; Brandes, Heitmann, & Müller, 2012; Dellal, Drust, & Lago-Penas, 2012; Owen, Wong, McKenna, & Dellal, 2011; Rampinini et al., 2007).

Coaches are prompted to focus on the game form, and coaches need to vary the conditions to increase the effectivity of the chosen game form. Both are crucial for the individual development of young players (Clemente, Couceiro, Martins, & Mendes, 2012).

Fenoglio (2004) already compared the effectiveness of different game forms with each other. He investigated the game forms of 4 vs. 4 and 8 vs. 8 with

each other to investigate relevant game events between these game setups in youth academies' U9 teams of professional Premier League clubs. The study has proven that 4 vs. 4 game forms force the players to play more passes, attempt to shoot more often, score more goals, try more 1 vs. 1 encounters, and execute more dribbling tricks (i.e., feints). Garcia, Román, Calleja-González, and Dellal (2014) consistently report a higher number of ball contacts per player, more offensive actions, and more goal attempts during SSG (5 vs. 5) compared to 7 vs. 7 and 9 vs. 9 in U9 and U14.

Additionally, Sarmiento et al. (2018) described in their review that explicitly the emotional aspects of SSG just as well as tactical and strategical aspects need to be addressed in certain studies.

Advantages of a new game form with four goals and fewer players seem to be obvious but should be scientifically examined due to their popularity and the constantly growing demands on young players. The German Football Association recently issued a guideline for piloting game forms in children's soccer, so the enforcement for the youngest age groups will be promoted at all levels of German soccer (DFB, 2019). Consequently, there is a great demand for research.

The present study elucidates differences in the frequency of the game events in possession of the ball (i.e., passing, dribbling, shooting, and scoring) between new and established game forms on technical or rather on individual

tactical demands at the U7 level in two federal soccer associations in Germany.

Methods

Data acquisition

The study investigated 23 games played in the new and 16 games played in the established game form (i.e., $n_{6vs.6} = 10$ and $n_{7vs.7} = 6$) at soccer clubs in two federal soccer associations in Germany. All of the players were members of U7 teams in their local clubs and participated in both game forms in the present study. The new game rules were oriented toward the guidelines of Funiño (Wein, 2004b). The rules for the established game forms were used as defined by the respective local guidelines of the federal soccer associations. Local teams participated voluntarily in this experiment in Rostock ($n = 2$) and Cologne ($n = 9$). The overall playing time and the single match durations varied between the different game forms and locations. At Rostock both game forms (i.e., new and established) were played with a duration of 10 min at an organized festival and a local tournament, respectively. The new game form was played for 12 min in each game and the established for 40 min at Cologne within the local league system. The teams in the established game form consisted of ten players each. Five players formed the teams in the new game form at both locations.

Video analysis

The games were recorded by stationed commercially available cameras filming the pitches throughout the whole game (GoPro Hero 4, Woodman Labs Inc., San Mateo, CA, USA; Casio EX-FH100, Casio Electronics Co. Ltd., Japan; Panasonic HC-V110, Panasonic Corporation, Japan; SONY HDR-CX240E, Sony Group Corporation, Japan). The video material of the pitches was acquired from an elevated perspective. All relevant game events (e.g., successful passing, dribbling, shooting, and scoring) were identified during the video analysis at a standard personal computer. *Passing* was counted when a player passed the

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Abstract

Soccer is constantly changing regarding the demands of the new generation. At its best, young players develop outstanding technical and tactical skills as well as a wealth of competition experience. In addition to targeted training, maintaining motivation is one of the biggest challenges facing youth coaches. One possible way is to build their confidence while having fun. As a new game form, 3 vs. 3 unites the main events of the soccer game, challenges young players in a versatile manner, and promotes joy. In the present study, 23 games played in the new and 16 games played in the established competitive styles (7 vs. 7 and 6 vs. 6) were compared and analyzed regarding the variables passing, dribbling, shooting, and scoring. MANOVA revealed a significant effect for the factor game form: $F(4,33) = 8.974$, $p < 0.001$, $\eta^2 = 0.521$. Additionally, post-hoc comparisons (using Sidak correction) indicated a significantly higher number for the occurrence of each game event in the new game form. This finding suggests an increased involvement. Child-friendly small-sided games (SSG; like the new game form) will help to promote children in the best way and inspire them to play soccer for a long time.

Keywords

Football · Children · Tactical concepts · Skill acquisition · Small-sided games

ball deliberately and successfully towards a teammate. *Dribbling* was defined as an active movement of a player keeping possession of the ball. *Shooting* was defined as a deliberate shot of a player towards the goal with the attempt to score. *Scoring* was counted when the ball fully crossed the goal line after a player's shot on goal. The described game events were counted by students using VLC player version 3.0.8 using reduced playing speed and pause function to determine the relevant game events.

Data analysis

The data were recorded in a table, logging the game events in correspondence with the teams, game form, and overall game duration. The number of game events were normalized to the game events per minute by division of the number of game events from the playing time. The data were processed using IBM SPSS Statistics 25.

The data were normally distributed for all game events in both game forms, as assessed by the Shapiro–Wilk test ($\alpha > 0.05$). One match of the game form 6 vs. 6 was identified as an outlier (three times higher standard deviation from the mean) with regard to the number of goals scored per minute and therefore excluded from data analysis.

The data were analyzed applying a Multivariate Analysis of Variances (MANOVA), because the analyzed game events are related to each other. Homogeneity of variances was asserted using Levene's test, which showed that equal variances could be assumed for shooting ($p = 0.373$) and could not be assumed for passing ($p = 0.043$), dribbling ($p = 0.000$), and scoring ($p = 0.018$). The result was corrected by Pillai–Spur.

Results

The results of MANOVA for game events revealed a significant effect for game form: $F(4,33) = 8.974$, $p < 0.001$, $\eta^2 = 0.521$. **Figure 1** indicates that all game events occur more often in the new game form as compared to the established game form.

Post-hoc comparisons (using Sidak correction) indicated a significant difference between the game forms for each game event: passing ($p < 0.05$, $\eta^2 = 0.150$), dribbling ($p < 0.001$, $\eta^2 = 0.429$), shooting on goal ($p < 0.01$, $\eta^2 = 0.251$), and scoring ($p < 0.001$, $\eta^2 = 0.408$).

Table 1 presents the frequency of game events in the new and the established game forms. It turns out that young soccer players in the new game form pass, dribble, shoot, and score on average more often than in the established game forms. Especially the event of scoring occurs in the new game form more than 2.5 times as often as in the established game forms. The variable dribbling showed a more than two-times higher factor in the new game form. If the interest is to develop players who are able to solve one-on-one situations, a focal point in training is such opponent overcoming dribbling.

Moreover, a MANOVA using the factor game form staged three times (i.e., 3 vs. 3, 6 vs. 6, and 7 vs. 7) shows similar results, $F(8,66) = 3.966$, $p < 0.01$, $\eta^2 = 0.325$.

Discussion

The aim of the present study was to compare technical differences between new and established game forms in youth soccer players at the U7 level. The main finding of this study was that players in the new game form pass, dribble, shoot, and score more frequently in comparison to players in established game forms.

The present study delivers evidence that with fewer players on a smaller pitch, the players, on average, are more involved in the game, because more game-specific actions take place. It can be speculated that a higher level of involvement leads to a higher motivation and much more excitement playing soccer. However, this assumption needs to be investigated in further studies which consider motivational aspects of the players.

In established game forms, many players do not really participate in the game for different reasons. However, in this age group, every player should more or less have the same amount of time on the pitch and try to improve his personal soccer skills and corresponding decision-making.

The German Soccer Association (DFB) proclaims a reform of the guidelines for young soccer players. The *Projekt Zukunft* (translation: Project Future) postulates a reformation of the playing conditions for athletes between 5 and 14 years (Bierhoff, 2019). The current study proves such statements derived from the practical knowledge of experienced coaches by empirical data.

Halouani, Chtourou, Gabbett, Chaouachi, and Chamari (2014) described in their review that there is only little information about the improvement of technical and tactical skills in team

Table 1 Frequency of game events (events per minute) in the game forms

	3 vs. 3		6 vs. 6		7 vs. 7		Comparison to 3 vs. 3 ^b	
	Mean ^a	StdDev	Mean ^a	StdDev	Mean ^a	StdDev	6 vs. 6	7 vs. 7
Passing	2.79	0.94	1.80	0.44	2.58	0.35	1.55	1.08
Dribbling	3.11	1.18	1.41	0.33	1.56	0.40	2.21	1.99
Shooting	1.36	0.47	0.78	0.29	1.00	0.38	1.74	1.36
Scoring	0.63	0.29	0.21	0.15	0.28	0.12	3.00	2.25

StdDev standard deviation

^aCounted after the standardization as *events per minute*

^bCalculated as a *factor* between the compared game forms

sports. The present data suggest that the motivation of young soccer players to practice their skills in SSG such as in the new game form is higher as compared to established game forms. In addition, the trained physiological parameters also benefit from a lower number of involved players (Halouani et al., 2014).

Moreover, Ford, Yates, and Williams (2010) delivered evidence that approximately 64% of the available time in training is used for training forms and approximately 36% of that time for playing forms for players of different ages (i.e., 9, 13, and 16 years) and different skill levels (i.e., elite, sub-elite, and recreational). The playing forms in youth soccer training are presented by SSG to 15.3% during the training, and larger games to 24.8% at the end of a training session (O'Connor, Larkin, & Williams, 2018). This ratio can be explained by the use of larger game forms during competition that will be played at the end of training sessions to simulate competition. Our results give rise to the fact that SSG (i.e., 3 vs. 3 or Funiño) in early soccer training (U7) will foster the development of teams regarding the technical-tactical skills and abilities if it is played as the competitive game form. Consequently, if 3 vs. 3 (i.e., Funiño) is played in a competitive format, coaches will develop their training towards this format accordingly; more playing time in this format is realized and youth soccer players (U7) execute more technical-tactical actions to develop new skills and find new tactical solutions by active decision-making activities (Roca & Ford, 2020). In addition, soccer-specific technical skills are developed by playing SSG without any loss in physical adaptation processes (i.e., improvement in the peak power and total work

capacity; Radziminski, Rompa, Barnat, Dargiewicz, & Jastrzebski, 2013). Thus, the trend regarding more decision-making activities in training will be further emphasized by a change in the competitive game format from 6 vs. 6 or 7 vs. 7 to Funiño (i.e., 3 vs. 3).

The pilot phase of the reorganization of used game forms in children's soccer in terms of new game form tournaments is a first and remarkable step to evolution of an enthusiastic and excited community of young soccer players in Germany. More studies like the present one should provide scientific legitimacy for these upcoming changes in German youth soccer. The present study delivers first insights into the establishment of new game forms played with two goals for each team. Nevertheless, it is the first approach in Germany to compare the impact of environmental conditions (i.e., field size, more than one goal, number of players, etc.) on players' behavior. Thus, it remains unclear whether physiological and team tactics will evolve properly towards the adult soccer game. In addition, it seems fruitful to investigate the impact of the game form on the performance of each individual player in further studies to verify how much benefit each player has from the different game forms.

Our main limitations are the differences in the number of games, teams, and playing times at different locations. However, we used a standardized procedure to examine the game forms in advance of the data acquisition. All raters have been educated regarding the definition of the game events by the principal investigators. Thus, all got the same briefing. Moreover, the investigated game events were clearly defined as they are described in the manuscript. The definitions re-

mained constant throughout the whole study. Additionally, the raters' performance was cross-checked by the principal investigators using another set of video sequences from 5 vs. 5 in youth soccer. We aimed to standardize the raters' observation performance between the different locations by this procedure.

In this way we succeeded in observing the most important variables in soccer. By including all matches and data, we were able to draw a comprehensible comparison between new (3 vs. 3) and established game forms (6 vs. 6 and 7 vs. 7). In future investigations, we would like to consider a larger sample and focus on the methodological weaknesses such as the missing analysis of inter-rater reliability.

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Declarations

Conflict of interest. H. Lex, M. Simon, and S. Schwab declare that they have no competing interests.

For this article no studies with human participants or animals were performed by any of the authors. All studies performed were in accordance with the ethical standards indicated in each case.

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