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Match-derived relative pitch area changes the physical and team tactical performance of elite soccer players in small-sided soccer games

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ABSTRACT

Small-sided games (SSGs) are used in training sessions to prepare for full-sized matches. For the same number of players, smaller pitch sizes result in decreased physical performance and shorter interpersonal distances. A relative pitch area derived from the full-sized match results in larger pitch sizes and this may increase the fit between SSGs and full-sized matches. This study aimed to investigate SSGs with a traditional small pitch and a match-derived relative pitch area in youth elite soccer players. Four age categories (under-13, under-15, under-17 and under-19) played 4 vs. 4 plus goalkeepers on a small (40x30m, 120m^2 relative pitch area) and large pitch (68x47m, 320m^2 relative pitch area). The number of games per age category ranged 15–30. Positional data (LPM-system) were collected to determine physical (total distance covered, high intensity distance and number of sprints) and team tactical (inter-team distance, LPW-ratio, surface area, stretch indices, goalkeeper-defender distance) performance measures and tactical variability. On a large pitch, physical performance significantly increased, inter-team and intra-team distances were significantly larger and tactical variability of intra-team distance measures significantly increased. The match-derived relative pitch area is an important training manipulation and leads to changes in physical and tactical performance 4 vs. 4 plus goalkeepers.

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KEYWORDS
Football; talent development; task constraints; time motion analysis; ball possession

Introduction

Small-sided games (SSGs) are typically played on reduced pitch dimensions, with a lower number of players and often with adapted playing rules (Hill-Haas, Coutts, Rowsell, & Dawson, 2008). A SSG is preferred over isolated drills as a training form in soccer, because of its similarity with full-sized matches. SSGs replicate the complexity of interaction with team members opponents, and the ball, while two teams have the opportunity to score (Aguiar, Botelho, Lago, Maçãs, & Sampaio, 2012). Both contain the attacking and defending flow and players need to take quick decisions in an ever-changing environment and make optimal use of their physical, technical and tactical abilities to perform (Gabbett & Mulvey, 2008). Therefore, SSGs are widely used to develop and improve soccer skills and prepare for the full-sized match, regardless of playing level or player's age. Manipulating task constraints in SSGs has proven to elicit a major influence on player's soccer performance. In particular, manipulating pitch size and number of players lead to changes in physical load (Casamichana & Castellano, 2010; Hodgson, Akenhead, & Thomas, 2014; Rampinini et al., 2007), frequency and rate of successful technical actions (Aslan, 2013; Casamichana & Castellano, 2010; Hodgson et al., 2014) and team tactical performance (Folgado, Lemmink, Frencken, & Sampaio, 2014; Frencken, van der Plaats, Visscher, & Lemmink, 2013; Silva et al., 2014; Vilar, Duarte, Silva, Chow, & Davids, 2014).

Pitch size manipulations are widely investigated in previous research, where pitch sizes are often expressed in the relative pitch area: the surface area of the pitch divided by the number of players to improve comparability between SSGs (Casamichana & Castellano, 2010; Castellano, Puente, Echeazarra, & Casamichana, 2015). In contrast to a full-sized match relative pitch area of approximately 320m^2, many SSGs are played on a pitch with a relative pitch area of 150m^2 or less (see for a review Aguiar, Botelho, Lago, Maçãs, & Sampaio, 2012; Hill-Haas, Dawson, Impellizzeri, & Coutts, 2011). This results in a high player density and less time and space for players to make decisions when holding the ball and less space to run. In contrast, it is easier to make a duel or mark an opponent, because of the short interpersonal distance (Aguiar et al., 2012). In terms of physical performance, players typically covered less distance in total (Castellano et al., 2015; Owen, Wong, Paul, & Dellal, 2014), although Casamichana, Castellano, and Castagna (2012) showed an opposite effect. In addition, players covered more distance in high or sprinting speed zones in SSGs compared to (friendly) full-sized matches (Casamichana et al., 2012; Castellano et al., 2015; Owen et al., 2014). No or very little distance was sprinted in most of the SSGs. Additionally, a higher occurrence for duels, lost balls and a lower percentage for successful passes and ball possessions was observed in conditioned SSGs, although these were played as possession games with supportive players (Dellal et al., 2012).

Thus far, small pitch sizes in SSGs have led to different physical and technical demands than the full-sized match.

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Yet, Araújo and Davids (2015) advocate an adequate sampling of the match to create a representative learning environment. Therefore, characteristics of small-sided games, such as pitch size, should be considered carefully to meet training outcomes and stay close to match demands. A pitch with a relative pitch area derived from the full-sized match can increase the fit between training and match performance. Then, players have a relative playing area similar to a match that allows more attacking and defending exploration and organization. This affords teams to follow the natural flow of the game: free-up space in ball possession and tie-up space when ball possession is lost with continuously changing interpersonal distances as a consequence (McGarry, Anderson, Wallace, Hughes, & Franks, 2002) and leads to more tactical variability. Castellano et al. (2015) applied such match-derived relative pitch area in several SSGs and investigated players' physical performance. In 7- and 9-a-side games with a 300m^2 relative pitch area, players covered total distance and in higher speed zones similar to 11-a-side games. Moreover, more distance was covered in total and in higher speed zones compared to games played on a relative pitch area of 100 and 200m^2. As long as the relative pitch area was similar as the full-sized match, a different number of players did not influence the physical performance. This emphasizes the relevance of a match-derived relative pitch area in SSGs, but the research to this effect is limited to one study and an under-13 team.

Findings of this young age group on a relative pitch area of 300m^2 might not be generalizable to older age groups, as previous research proved that physical and team tactical performance change with increasing age. Older soccer players covered more distance in total and in high speed zones in studies concerning age groups ranged 11–16 and 13–18 year (Buchheit, Mendez-Villanueva, Simpson, & Bourdon, 2010; Goto, Morris, & Nevill, 2015). However, these differences were not observed in younger soccer players aged 13–15 years (Atan, Foskett, & Ali, 2016). Besides, team tactical performance changes as age increases. Intra- and inter-team distances and team tactical behaviour changed when soccer players are older (Barnabé, Volossovitch, Duarte, Ferreira, & Davids, 2016; Folgado et al., 2014; Olthof, Frencken, & Lemmink, 2015). Under-13 soccer players showed lower length-per-width values and higher inter-team distances than younger age groups in SSGs (Folgado et al., 2014). Supportive findings were present in team dispersion in SSGs for age categories under-17 and under-19 (Barnabé et al., 2016; Olthof et al., 2015). Altogether, age influences soccer performance, both physically and tactically. In sum, current research is fragmented in age groups, performance measures and pitch sizes. There is a need for research that investigates pitch size manipulation of a match-derived relative pitch area across a larger range of age groups on physical, technical and team tactical performance in elite soccer players.

While small pitch sizes result in different physical demands in SSGs, large pitch sizes might increase the physical demands. A match-derived relative pitch area is likely relevant for the team tactical behaviour as well, because players have similar time and space on the pitch as in a full-sized match situation. Therefore, the aim of this study is to determine the physical performance and team tactical behaviour in 4 vs. 4 plus goalkeepers played on a traditional small pitch and on a pitch with a relative pitch area of the full-sized match. The hypothesis is that, as a response to an increased pitch size, physical performance in high speed zones and inter- and intra-team tactical performance measures will increase. In addition, age groups are likely to respond differently to both SSGs.

Methodology

Participants

In total, 148 players (125 outfield players and 23 goalkeepers) from three Dutch professional youth soccer academies participated in this study and were assigned to the under-13, under-15, under-17 or under-19 age group. Each team played five bouts of a 4 vs. 4 plus goalkeepers SSG on a small pitch and five bouts on a large pitch . Each format of the small-sided game was played in a separate training session (see Table 1). Players were assigned to a team according to the coach's perception to equally balance the quality of the teams. Substitutions were only allowed between the games to create randomness in the composition of the teams or in case of an injury suffered during the SSG. All players were notified of the purpose of the game. Players and their parents or legal guardians signed an informed consent. All procedures were in accordance with the standards of the local ethical committee of Human Movement Sciences of the Medical Faculty of the University Medical Center Groningen, University of Groningen, the Netherlands.

Design

The small pitch equals 40x30m, as this is often used during practice and in previous studies (e.g. Faude, Steffen, Kellmann, & Meyer, 2014; Hodgson et al., 2014; Kelly & Drust, 2009; Olthof et al., 2015). The relative pitch area is 120m^2. Pitch dimensions of the large pitch are derived from the 11 vs. 11 full-sized match (i.e. 100x70m). The relative pitch area in a full-sized match is 320m^2. This area is also applied to a SSG with 4 vs. 4 plus goalkeepers and equals 68x47m pitch size. The penalty box was proportionally reduced in both games and goals were official FIFA-approved goals (7.32x2.44m). All games were played on an artificial turf pitch.

Each SSG had a duration of 4 minutes. A 4-minute rest period between SSGs provide an optimal recovery (Köklü, Alemdaroglu, Dellal, & Wong, 2015). Each team started in the same formation of 1 goalkeeper, 1 defender, 2 midfielders and 1 attacker. This formation was chosen based on the opinion of expert coaches, to ensure that teams played in 4 lines and to control for possible different team strategies based on starting formation. Coaches were instructed to coach their players

Table 1. Number of teams and players participating in the SSGs.

	SSGs	Clubs	Players	Age (years) (mean ± SD)
Under-13	20	2	36	12.5 ± 0.5
Under-15	30	3	43	14.4 ± 0.5
Under-17	15	2	28	16.6 ± 3.2
Under-19	25	3	43	17.9 ± 1.0

similar to a competitive match (Hill-Haas et al., 2008; Hill-Haas, Rowsell, Dawson, & Coutts, 2009). The purpose of each SSG was to win by scoring more goals than the opponent.

Playing rules of the SSG on a large pitch were in accordance with those of a full-sized competitive match. That is, the offside rule was applied and a kick-off from the centre spot took place at the start and after each goal. In contrast, during the small pitch SSGs, the offside rule was not applied, because of the limited dimensions and in accordance with the rules in previous studies. After a goal, the goalkeeper restarted the game with a goal kick.

Data collection

Positional data of all players were collected with the Local Position Measurement (LPM) system (Inmotio Object Tracking BV., Amsterdam, the Netherlands). Validation studies established that this is a valid instrument to accurately obtain x- and y-coordinates of each player on the pitch with a high sampling frequency of 1000 Hz divided by the number of transponders on the pitch (Frencken, Lemmink, & Delleman, 2010; Ogris et al., 2012). Each player wore a vest during the SSGs and positional data was collected with a minimum sampling frequency of 42 Hz and a maximum sampling frequency of 100 Hz.

In addition, videos were recorded with one or two HD video dome cameras (Bosch GmbH., Stuttgart, Germany) and one or two high resolution digital cameras (Canon HF100, Canon Inc., Tokyo, Japan; JVC Everio, JVC Kenwood Corporation, Kanagawa, Japan). Videos were automatically synchronized with the positional data in the LPM-software. Markers for the start and end of each SSG were placed based on audio-visual inspection of the videos.

Data processing

Game characteristics were determined with notational analysis using the video recordings. Number of transitions and duration of ball possession sequences, set pieces and number of goals and shots were counted per SSG. A team was in ball possession when it was in control over the ball (Collet, 2013). When the opposition won and was in control of the ball by at least one deliberate touch, a transition took place. Time of ball possession was determined as duration of a ball possession sequence. Set pieces were determined as any type of action to return the ball into play by means of a throw in, corner kick, goalkeeper kick and kick off. Any attempt to score a goal was taken together to determine the frequency of goals and shots (Rampinini, Impellizzeri, Castagna, Coutts, & Wisløff, 2009). A study on an unpublished dataset performed on the game characteristics revealed a inter-rater reliability of .89 (Cohen's K) for number of transitions, .92 (Pearson's R) for duration of ball possession and 100% agreement for set pieces and number of goals and shots.

Physical performance per player was computed with the positional data. Total distance covered per minute, distance covered at high intensity (HID, ≥ 19.8 km/h) and number of sprints (frequency of displacements ≥25.2 km/h) were quantified for every player (Abt & Lovell, 2009). Speed thresholds are kept similar for all age categories to compare physical performance between age groups (Goto et al., 2015).

Positional data were also used to calculate tactical performance measures in Matlab R2015b (The MathWorks, Inc., Natick, MA, USA). Centroid positions were determined as the average position of the outfield players and were used to calculate longitudinal (X) inter-team distances (Frencken et al., 2013). This is an indication of the pressure of one team on the other. Length and width were calculated and used to determine the length-per-width (LPW) ratio per team (Folgado et al., 2014). This ratio is a measure of the shape of the team. Total surface area is the area of the convex hull (Frencken, Lemmink, Delleman, & Visscher, 2011). The stretch index is the mean distance of each outfield player to the team centroid in either longitudinal and lateral (Y) direction (Bourbousson, Sève, & McGarry, 2010). Together with the surface area, the stretch indices are an indication of the size of the team. Goalkeeper (GK)-defender distance represents the space between goalkeeper and defending line.

Statistical analysis

Values of the game characteristics, physical and team tactical performance measures were checked for their normality. Assumptions were not violated. Then, means and standard deviations were calculated for each age category per SSG with Matlab R2015b. A MANOVA (Pillai's Trace) was conducted to test the significant differences in pitch size using R for Windows 324 (R Foundation for Statistical Computing, Vienna, Austria). Coefficients of variation of team tactical performance measures were used to investigate tactical variability. Differences were tested to evaluate differences in type of SSG and age group. Significance level was set at 5%. Effect sizes were determined by calculating partial eta-squared (η_p^2)(Levine & Hullett, 2002). Effect sizes are considered as small ($\eta_p^2 < .06$), moderate ($.06 \leq \eta_p^2 < .15$) or large ($\eta_p^2 \geq .15$) (Cohen, 1988).

Results

A significant main effect of pitch size was observed for all game characteristics ($F = 18.56$; $p < .01$), physical performance ($F = 141.15$; $p < .01$) and team tactical performance ($F = 192.71$; $p < .01$). Less transitions, organized ball possessions and goals/shots resulted in a longer duration of ball possession on a large pitch (Table 2). In addition, physical performance was higher on a large pitch, expressed as more distance covered ($F = 194.24$; $p < .01$; $\eta_p^2 = .22$), more HID ($F = 364.44$; $p < .01$; $\eta_p^2 = .34$) and a higher occurrence of sprints ($F = 106.12$; $p < .01$; $\eta_p^2 = .13$; Figure 1). Inter-team distance ($F = 358.00$; $p < .01$; $\eta_p^2 = .68$), LPW-ratio ($F = 17.83$; $p < .01$; $\eta_p^2 = .10$), longitudinal ($F = 225.57$; $p < .01$; $\eta_p^2 = .57$) and lateral stretch index ($F = 112.92$; $p < .01$; $\eta_p^2 = .40$), surface area ($F = 215.15$; $p < .01$; $\eta_p^2 = .56$) and GK-defender distance were also significantly larger on a large pitch ($F = 347.85$; $p < .01$; $\eta_p^2 = .67$, Figure 2). Moderate to large effect sizes were observed for all variables.

Significant interaction effects (pitch size*age category) were found for physical ($F = 4.37$; $p < .01$) and team tactical performance ($F = 3.17$; $p < .01$). With older age, there was

Table 2. Game characteristics (mean and standard deviation) of SSGs played on small and large pitches in four age categories. Test statistics and effect sizes are presented for main effect of pitch size.

		under-13		under-15		under-17		under-19				
		Small	Large	Small	Large	Small	Large	Small	Large	*F*	*p*	η_p^2
Transitions	Mean	24.20	17.80	25.33	17.53	22.20	13.50	27.40	16.10	66.48	<.01	.45
	SD	8.19	5.96	6.66	4.12	3.27	2.92	4.78	2.33			
Ball possession (s)	Mean	10.70	13.19	9.03	11.50	10.66	15.42	8.54	13.74	32.71	<.01	.29
	SD	4.02	5.98	2.56	2.42	1.19	3.48	1.59	2.55			
Set pieces	Mean	6.00	4.00	6.87	3.67	5.80	2.30	7.20	4.30	46.76	<.01	.36
	SD	2.40	2.00	2.67	1.99	1.48	1.49	2.51	1.34			
Goals/shots	Mean	7.80	4.00	8.33	5.00	7.00	5.00	8.67	6.40	35.02	<.01	.30
	SD	3.55	1.63	2.74	2.00	1.22	1.49	3.44	1.17			

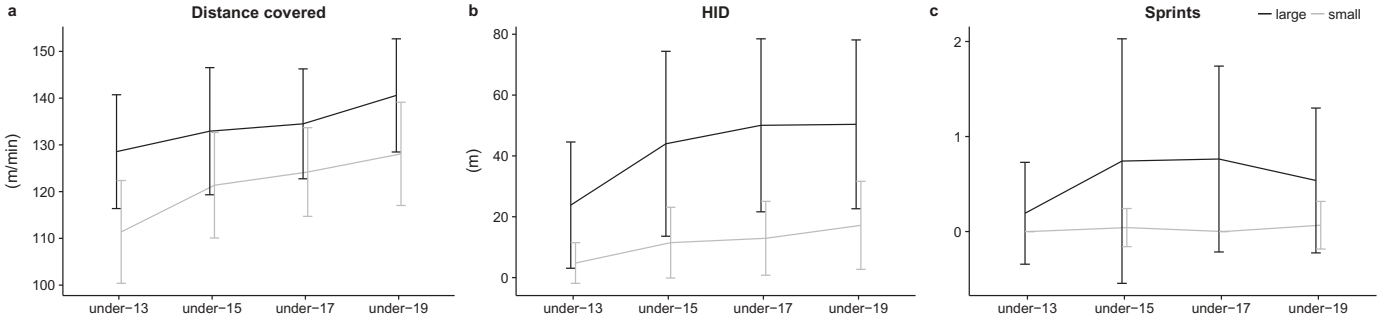

Figure 1. Physical performance (mean ± standard deviation) in SSGs played on small and large pitches in four age categories.

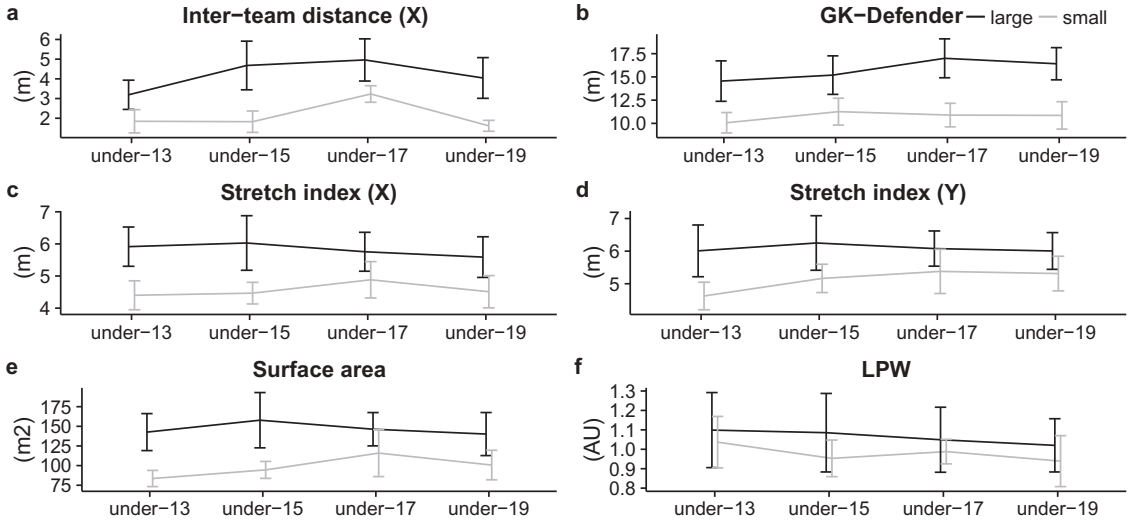

Figure 2. Team tactical performance measures (mean ± standard deviation) in SSGs played on a large and a small pitch in four age categories.

more HID ($F = 5.16$; $p < .01$; $\eta_p^2 = .02$) and more sprints were conducted on a large pitch ($F = 5.25$; $p < .01$; $\eta_p^2 = .02$, Figure 1). In addition, inter-team distance ($F = 7.90$; $p < .01$; $\eta_p^2 = .12$) and GK-defender distance ($F = 3.34$; $p < .05$; $\eta_p^2 = .06$) increased with older age on a large pitch, longitudinal stretch index ($F = 3.05$; $p < .05$; $\eta_p^2 = .05$) decreased on a large pitch and lateral stretch index ($F = 2.82$; $p < .05$; $\eta_p^2 = .05$) and surface area ($F = 4.37$; $p < .01$; $\eta_p^2 = .07$, Figure 2) increased on a small pitch. Observed effects were small, with a moderate effect for inter-team distance and surface area.

A significant main effect of pitch size was also found in tactical variability ($F = 25.49$; $p < .01$). Tactical variability was significantly larger on a small pitch for inter-team distance ($F = 14.13$; $p < .01$; $\eta_p^2 = .08$), but larger on a large pitch for LPW-ratio ($F = 22.58$; $p < .01$; $\eta_p^2 = .13$), longitudinal ($F = 44.39$; $p < .01$; $\eta_p^2 = .21$) and lateral stretch index ($F = 28.03$; $p < .01$; $\eta_p^2 = .14$), surface area ($F = 7.65$; $p < .01$; $\eta_p^2 = .04$) and GK-defender distance ($F = 4.61$; $p < .05$; $\eta_p^2 = .03$, Figure 3).

Discussion

In the present study, the aim was to investigate soccer performance in SSGs played on a traditional small pitch size and on a large pitch size derived from the full-sized match. As they are often used in training sessions both to prepare for the full-sized match and to improve soccer skills, it is important to play representative SSGs (Araújo & Davids, 2015). The large pitch is

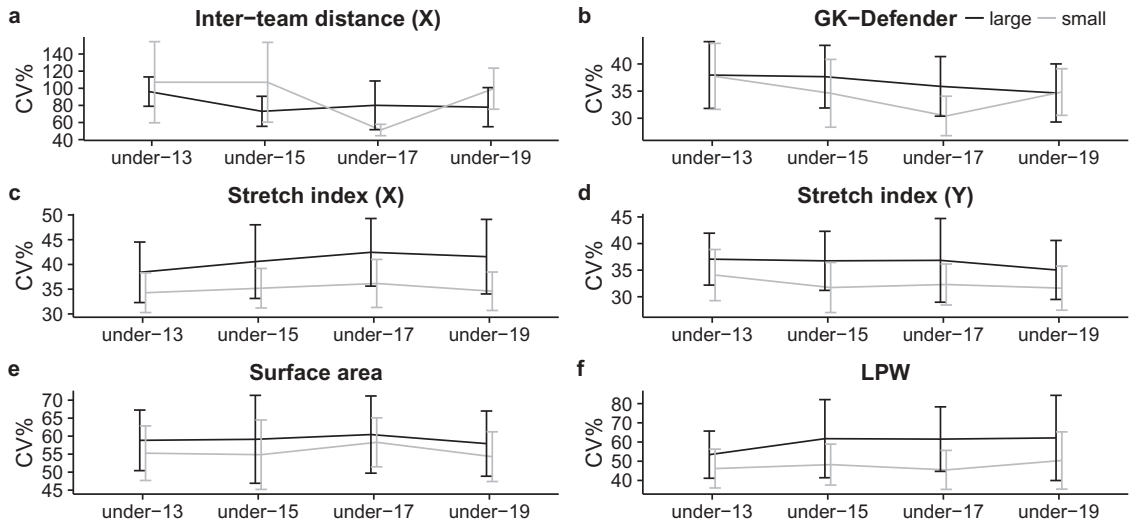

Figure 3. Variability of team tactical performance measures (mean ± standard deviation) in SSGs played on a large and a small pitch in four age categories.

a much larger manipulation than used in previous studies, as it has a relative pitch area derived from the full-sized match. As a consequence, main results were in accordance with the hypotheses: players covered more distance in total and in high speed zones and inter-team and intra-team distances were larger on the large pitch. Additionally, large pitch size evoked longer periods of ball possession and less transitions and more tactical variability of intra-team distance measures.

The current study confirmed the hypothesis that physical performance was significantly larger on a large pitch, emphasized by moderate to large effect sizes. These results are in accordance with previous studies where larger pitches evoked higher physical demands and no occurrence of sprints or HID on a small pitch (Casamichana & Castellano, 2010; Hodgson et al., 2014). Moreover, this study adds to the knowledge on physical performance on a match-derived relative pitch area by Castellano et al. (2015). 4 vs. 4 plus goalkeepers on a match-derived relative pitch area evoked similar high physical loads as games with a larger number of players and a similar higher physical load than SSGs played on traditional small pitch sizes. This match-derived relative pitch area is a training format with the potential to be used as a representative learning environment for all number of players in a team (Araújo & Davids, 2015). A SSG played on pitch size with 320m^2 relative pitch area possibly affords physical demands similar to full-sized match demands, although current results on distance covered are higher (on average 130 m/s) than in the full-sized match of under-13 – under-15 New Zealand soccer players (on average less than 100 m/s) (Atan et al., 2016). However, full comparison to full-sized match performance is limited, because of the use of different speed thresholds or correction for differences in time duration.

Team tactical performance responded, as hypothesized, to the pitch size manipulation: a large pitch afforded larger inter-team and intra-team distances than a small pitch. Under influence of the match-derived relative pitch area, the space management of the teams altered with more distance between teams and a larger dispersion of the players within a team. Current results were in accordance with previous studies when playing on small pitch sizes. Longitudinal inter-team distance was similar to Frencken et al. (2013) and Olthof et al. (2015) (both on average 2m), but 1m smaller than Folgado et al. (2014). Longitudinal and lateral stretch indices and LPW-ratio were in accordance with results of Olthof et al. (2015) and Folgado et al. (2014). As expected, all inter-team and intra-team distances increased significantly when teams played on a match-derived pitch area. Players adopted a larger dispersion on the pitch, with larger interpersonal distances of the outfield players and larger distance between the goalkeeper and defenders. Evidently, small pitch sizes limited interpersonal distances, while match-derived relative pitch area afforded teams to adopt a larger dispersion both in the longitudinal and lateral direction.

Along with the increase of inter- and intra-team distances as a response to an increased pitch size, variability of the team tactical performance measures changed. Teams' self-organizing behaviour leads to continuously changing inter-team and intra-team distances (McGarry et al., 2002). Teams showed a more stable behaviour in inter-team distance on a large pitch, with less variability. A match-derived relative pitch area afforded significantly more tactical variability in intra-team distances than a small pitch. This likely corresponds with attacking behaviour where teams increase interpersonal distance to explore attacking opportunities and with defending behaviour where teams try to tighten interpersonal distance as much as possible to give the opponent no space for attacking exploration. Current research demonstrated that intra-team distances on a small pitch were smaller with less variability. Then, teams are in a compact organization constrained by the pitch size which does not allow much variability. On a large pitch, in contrast, teams can increase their intra-team distances in order to attack without being limited by pitch dimensions, but still have the opportunity to decrease interpersonal distances to defend. This seems to be supported by the results of the game characteristics. Longer periods of ball possession on the large pitch gave teams more time to organize according to attack and defence, i.e. increase and decrease team size.

Pitch size manipulation affected game characteristics, displayed by differences in ball possession duration, number of transitions and goal attempts. Team dispersion and inter-team distance increased on a large pitch and it is likely that teams kept ball possession, because of larger interpersonal distances and less pressure of the opponent. Longer ball possession duration on a large pitch did not result in more goals or shots, which is in line with Lago & Martín (2007). They revealed that more ball possession was even negatively related to success. In SSGs on a large pitch, a player is less afforded to attempt a shot at goal, because distance to the goal is larger. This behaviour is more in line with the build-up of an attack in a full-sized match where the ball is passed around in order to try to score a goal.

Significant interaction effects demonstrate that differences in physical performance and team tactical performance between pitch sizes is amplified by age, but effect sizes were small. Players especially showed an increase in the high demanding HID and sprinting on a large pitch with older age. This is likely associated with an increase in inter-team distance and goalkeeper-defender distance on a large pitch as the age increased. On a small pitch with a high density of players, teams were forced to stand close to each other, but these interpersonal distances increased on a large pitch. Young players are inclined to play close to the ball, but did not show the same amount of increase in their interpersonal distances on a large pitch. This is likely to be explained because of their less developed physical and perceptual skills which hinders them from exploring the options they are afforded on the large pitch (Buchheit et al., 2010; Goto et al., 2015; Williams, 2000). Because speed thresholds are kept similar in this study, development of physical performance over age are emphasized on a large pitch. Dispersion measures as lateral stretch index and surface area increased on a small pitch with older age, which is in accordance with findings of Barnabé et al. (2016) and Olthof et al. (2015), but remained similar on a large pitch.

Results of this study provide soccer trainers insight in the effects of pitch size manipulations, where a larger pitch led to an increase in physical performance, inter-team and intra-team distances and ball possession duration. Findings of the effects of a match-derived relative pitch area in SSGs give trainers opportunities to design appropriate training formats that are more representative for the full-sized match, although future research is warranted to address this issue. Players perform in such SSGs in a similar relative playing area as in the 11-a-side game with similar performance outcomes. This playing area provides players time and space for exploration and coordination similar to the full-sized match. This gives teams the opportunity in attack to increase their surface area and tighten interpersonal distances in defence.

Conclusions

The current study is the first investigating physical and team tactical performance together on a match-derived relative pitch area in four age categories across three youth academies of Dutch professional soccer clubs. Match-derived pitch area in 4 vs. 4 plus goalkeepers showed a major influence on all performance measures investigated in this study. Pitch size shaped physical performance, team tactical performance and game characteristics. Match-derived pitch area afforded soccer players more space to explore during attack and defence. This manipulation led to higher physical demands and allowed teams to increase intra-team distance resulting in larger surface areas and stretch indices and more tactical variability. Although the representativeness for the full-sized match needs to be established in future research, a match-derived relative pitch area has the potential to act as an adequate sampling of the match performance environment, which is important to create a representative learning environment for the player (Araújo & Davids, 2015). This enhances representativeness of SSGs for the full-sized match.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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