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DIFFERENCES BY FIELD POSITIONS BETWEEN YOUNG AND SENIOR AMATEUR SOCCER PLAYERS USING GPS TECHNOLOGIES

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Abstract*

Aim. The aim of this study was to examine the player performance model (PPM) of soccer by field position, between under 20 amateur players and over 20 amateur players, with the using of GPS (K-Sport Universal, Italy).

Methods. The performance parameters data collection has been possible with GPS (Global Position System). In our case were analysed 6 matches in First Category championship (Marche, Italy), corresponding at the seventh level of Italian league and 6 games of the Juniors Provincial championship (Marche, Italy), using 10 GPS (20 Hz, K-Sport International, Montelabbate, Italy), 5 for each team, each divided into positions, to give larger specificity to the study. Afterward data were analysed.

Results. The analysis of the data, shows that, the under 20 travelled more distance in high intensity during a game, than over 20. But the over 20 travelled higher total distance, probably this data is influenced by the average of minutes played, that is lower in the over 20 because they effectuated more substitutions during the detected games.

Conclusions. It is being understood that technical and tactical qualities are the most important values for a football player, anyway during the last years the physical performance became crucial to determinate the result of a game. The detection of PPM helps to increase the quality of the training schedule, furthermore differentiate the PPM even for category and field position, can make more specific and accurate the work of the coaches and fitness trainer.

Keywords: GPS, soccer, player position, players performance model, amateur, young, senior.

Introduction

The purpose of this study is to determine the differences of player performance model between over 20 and under 20 players even divided by role. This analysis, make possible to achieve parameters that may be useful to understand which field positions a player can be more efficient. Moreover purpose of this study is to determinate objective assessment of athletes, even for talent research, taking into account, as already told, that these parameters only figures physical values and not technical or tactical ones.

This work was carried out with GPS tracking systems, GPS 20Hz (K-Sport, Italy) and using the K-Fitness data analysis software, performed by Sport Advanced Research Group by University of Urbino Carlo Bo, School of Sport and Health Science Department of Bimolecular Science and K-Sport Universal, Italy. Soccer is a sport that requires a significant effort from the physical point of view, using aerobic-anaerobic metabolism; concerning this sport, over the past years, several scientific studies have been conducted to try to revise the training methods, using more or less consciously a series of computer dedicated technology to assessing the performance during the match and training practice. This paper therefore proposes to indirectly investigate and replace the physiological components of player performance model (PPM), divided by positions, produced by an under 20 and an over 20 team player. Obviously, the performance is also achieved by technical, tactical and strategic components that will not be taken into account in this work.

The player performance model is made by many components that helps to create sports performance itself. A sports performance model tends to organize in simple way all the aspects and elements that converge together to create the sports performance itself, in this way is simple to evaluate the level of a single player or of an entire team, linking it with reference data obtained from surveys and statistical analysis. The performance model (PPM) describes the individual elements that form a totality, which, in our opinion, cannot be considered a simple sum of its components. Each editing action on one or more elements influences in total all the others, both positively and negatively. It should be well know that the specific performance model (SPM) of sports is constantly changing, especially in recent years, which have seen remarkable growth of utilization of applied technologies, as well as an exponential attention by sports scientists particularly in soccer area. The PPM then is a set of

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complex interactions, formed, as mentioned, by various components at the same time, and it must be dynamic and adaptable to the match situations, in fact, it varies for instance from the category or from country to country, according to the game styles and the characteristics of the athletes involved in the matches. Football, as mentioned, is characterized by an aerobic-anaerobic metabolic alternating system, with load on muscular system that varies between short phases with high commitment and phases with lower intensity. We could say that the physical performance, in this case is given by the sum of different components that can be described in a very simple formula (Bangsbo, 2006).

Athletic Performance = Fitness State - State of Fatigue

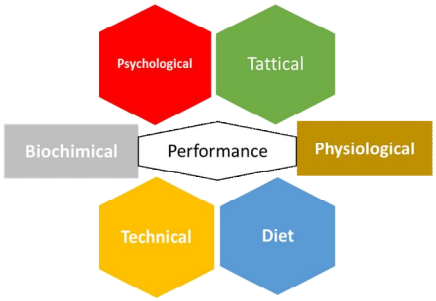

Figure 1 - Performance Model Scheme, R. Izzo, 2016

The PPM of elite footballer was built through evidence based data compared with the studies in scientific literature, below will be described the main components. Medium anthropometric characteristics of the player are as follows (Roi, 2014): Height (cm): 184 ± 6, Weight (kg): 80 ± 5, BMI (kg / m2): 23.7 ± 1.0 and Fat (%): 13 ± 3. The total average distance travelled in a game is plus minus 11 km, it is obviously influenced by the different roles, from the adopted module and the tactical settings of the game (Stølen, Chamari, Castagna & Wisløff, 2005).

Usually players who travel more kilometres are midfielders, following the attackers and at last defenders. Another main aspect in our point of view is connected to the distance travelled to the various speed racing intensity (Izzo, Carozzo, 2015). Data information are derived from some recent studies on elite footballers (Roi, 2014): ± 3700m Walk (0.2 to 7.2 km / h), ± 4400m Low intensity/jogging (7.3 to 14.4 km / h), ± 1800m Medium intensity (14.5 to 19.8 km / h),± 750m high intensity (19.9 to 25.2 km / h) and ± 270m Sprint (> 25.2 km / h). During a match, a player makes about 1300 activity changes, for example switching from the low intensity walk to sprint intensity. It is important to note that the distance travelled with the ball is approximately equal to 2% of the total distance (Bangsbo, 2006).

Another important aspect in PPM is number and intensity of sprint, during games, there is a sprint every 90 seconds, each one with an average of 2-4 seconds duration, sprints covered the 0.5-3% of total playing time. Normally they are in 96% of cases shorter than 30 mt and in the 50% shorter than 10 mt (Roi, 2014). The players that travel the farthest distance in sprint are the attackers, followed by side-backs and the side midfielders, while the central defenders and central midfielders are the ones who make the fewest meters. Accelerations and decelerations are another determinant aspect, respectively for accelerations is calculated from 2.5 to 4 ms2 and decelerations -2.5 to -4 ms2, players produce an average of 100 variation for each match (Izzo, Sopranzetti, 2016).

Are also evaluated the intense accelerations (IA> 4ms2) and intense decelerations (ID <- 4ms2) that are around 10 per game. Their number, obviously decrease during the second half (Roi, 2014). Another key indicator, used to evaluate internal load, is the heart rate (HR) who determined to discover soccer performance effort. During a match is between the 75% and 90% of Max H.R. and as for the other variables tends to be higher during the first half and decrease in the second (Stølen, Chamari, Castagna & Wisløff, 2005). The VO2Max average is 53 ± 7 (ml/kg/min) with a range of values ranging from a minimum of 50 to a maximum of 75 ml/kg/min (Osgnach, Poser, Bernardini, Rinaldo & Di Prampero, 2010). It is observed that the blood lactate during a game is between 8-12 mmol/L, as usual, the value recorded during the first half is higher, in relation to the fact that the distance travelled and the high intensity detectable is lower the second half (Stølen, Chamari, Castagna & Wisløff, 2005).

We know that a player runs about 11 Km per game, with 1,300 changes of activity, of which 220 carried out at high speed, with variations between the first and second half, 1st half have greater distance travelled at low speed run and less

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sprinting (Rampinini, Coutts, Castagna, Sassi & Impellizzeri, 2007). In 98% of the time the players are not, in possession of the ball (Reilly & Thomas, 1976). As regards the differences between the PPM in relationship with field position, Central Back appear to be the players who travel less total distance (TD) 10,554 Km, less sprint 1.8% of TD and less distance at high intensity 2.1% of TD (Dellal et al., 2011) but more acceleration and decelerations (Mallo, Mena, Nevado & Paredes, 2015). The centre midfielders are those that travel greater TD (11,401 Km), as confirmed by several studies (Vigne, Gaudino, Rogowski, Alloatti, & Hautier, 2010). Full back and external midfielders are the ones that make the biggest number of accelerations and sprints compared to the other positions, even if others believe that they are the forwarders to have this record 2.6% sprint compared to TD, forwarders still reach the highest values in the maximum speed peaks (Ferro, Villacieros, Floria & Graupera, 2014). Despite small differences between various studies, it is easy to understand that for every field position there is a specific physiological demand. Therefore, it is necessary to train the different characteristics individually for each positions.

Positions	Weight (Kg)	Height (m)	TD (Km)	SPRINT (>24 Km/h)	HIR (21-24 Km/h)	S. MAX (Km/h)	Average H.R (% H.R Max)
BC	77,7	1,81	10.556	1,80%	2,10%	27,7	85,10%
FB	71,38	1,76	10.712	2,40%	2,40%	29,2	83%
CM	71,05	1,75	11.401	2,20%	2,70%	26	86%
WM	/	/	11.140	2,30%	2,60%	29,3	85%
FO	71,71	1,79	10.759	2,60%	2,70%	29,3	84%

Table 1 – PPM parameters for Field Positons (Ferro, Villacieros, Floria&Graupera, 2014).

The table 1 shows how the central defenders have a more massive body structure than the other positions, in order to create accurate training programs, is important to know specific anthropometric details for each positions. The PPM are also influenced by the schemes and the coach's tactical dictates. The study by Tierney, Andrew, Neil & Duncan, 2016), analyses the value of PPM comparing different gaming formations. Each module provides a different physiological and tactical demand. However, as already known, football is an open-skill sport, so often the difference is not made only by modules but rather from physiological approach and coach dictates to the game, these variables create unpredictable indicators. Below we report a table that shows average values of a player in relation to the used formation (Table 2).

Formations	TD (Km)	HSR (> 19,8 Km/h)	High Metabolic Distance (acc/dec > o <2 m/s-2)	N° Acc (> 3 m/s+2)	N° Dec (< 3 m/s-2)
3-5-2	10.528 ± 567 m.	642 ± 215 m.	2025 ± 304 m.	34 ± 7	57 ± 10
4-2-3-1	10.044± 538 m.	538 ±174 m.	1849 ± 301 m.	38 ± 8	61 ± 12
4-4-2	10.131 ± 583 m.	497 ± 175 m.	1568 ± 257 m.	33 ± 10	49 ± 14
4-3-3	10.284 ± 879 m.	514 ± 204 m.	1828 ± 518 m.	32 ± 8	50 ± 12
3-4-3	10.168 ± 449 m.	551 ± 171 m.	1855 ± 301 m.	28 ± 7	51 ± 10

Table 2 – PPM parameters variations by Formations (Tierney, Andrew, Neil & Duncan, 2016).

The table shows that:
- The 3-5-2 scheme is the most expensive scheme in relationship with TD, Hig Speed Run (HSR) and High Metabolic Distance (HMD)
- The 4-2-3-1 is the formation that requires greater accelerations and decelerations, but less TD
- The 4-4-2 is the scheme that show less HMD commitment.

Looking at this data we could easily understand once again that the physiological demands of the players should be trained individually, taking into account the different variables (scheme, location, physical structure etc.).

Methods

We have been analysed, using K-GPS 20hrz (from K-Sport International, Italy), 6 championship matches, from first category Marche, Italy (7th Italian championship series) and 6 games of the provincial junior championship, under 20, Marche Italy during 2016 season. They were used

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10 GPS to track every game, 5 for each team divided into positions. For every team and every game were analysed a forward, a central midfielder, wide midfielder, a central defender a full back. This was done to give greater specificity and differentiation to performance indicators, in order to define both the peculiarities of the various roles, both obtained relevant and reliable ideal parameters.

The GPS have been added inside of a specific sport shirts with a pocket placed on it's back, in a position that does not cause an impediment to the player. As we said already, 10 GPS where divided 5 for each team, one for every role: as cited central back defender, a full back defender, a central midfielder, a wide midfielder and a forward. The GPS were worn and turned on before warm-up. Data were collected by downloading them all from the GPS devices with a dedicate software (K-Fitness, K-Sport International, Italy).

The information files, on ".cvs", were filtered and analysed through the software automatically and directly have been stored in online portal (K-Sport Online, K-Sport International, Italy). Through the portal, it was possible to download the Excel spreadsheet containing all the data of the matches. Analysing final data it was possible to create the appropriate conclusions by comparing the examined categories. The examined roles are central back (CB), full back (FB), central midfielder (CM), wide midfielder (WM) and forward (FO). This has been done to give greater specificity and differentiation to performance indicators, in order to define the peculiarities of the various roles.

Parameters

The following parameters created by K-Sport universal (2010) are taken into account according to the protocol:

- Distance (meters, D)
- Relative Distance (meters/minutes, DRel)
- Metabolic Power Average (watt·kg-1, AMP)
- High Speed Distance (> 16 km/h, S_HI)
- High Acceleration Distance (> 2 m/s/s, AccHI)
- High Deceleration Distance (< -2 m/s/s, DecHI)
- High Metabolic Power Distance (AMP ≥ 20 watt·kg-1, D_MPHI)
- % High Speed Distance (% S_HI)
- % High Acceleration > 2 m/s/s (% ACCHI)
- % High Deceleration < -2 m/s /s (% DECHI)
- % High Metabolic Power Distance (% D_MPHI)

Have been taken into account even the distance travelled in speed thresholds from DS1 to DS6 (K-Sport Universal, 2010); it follows the list of threshold parameters:

- DS1 = 0-10 km/h
- DS2 = 10-14 km/h
- DS3 = 14-16 km/h
- DS4 = 16-21 km/h
- DS5 = 21-24 km/h
- DS6 > 24 km/h

Results

The performance data results obtained with the GPS were divided, following the field positon for both group. The tables below shows the averages of the data collected during the analysis and the average minutes played for each role. The Tables 3 and 4 compare all parameters to highlight which categories and specifically what role showed higher physical performance data.

Data are compared row by row, white cells show average values, the variation gradation of red and green indicate how a values deviates from average. Data are more close to the average when the colour is faded, more are darker than moves away. Dark green indicate extremely high values and dark red show extremely low parameters.

Data was compared positions by position, of the two categories. In the tables below (Table 6,7,8,9) arrows helps to identify the performance index. The parameters are evaluated separately row by row, the yellow arrow expose the average values, green arrow shows values above the average and the red arrow point out values below the average. With this kind of illustration it is easy to read the results and determine what role had better external load.

Positions/Category										
Parameters	Central Back		Full Back		Central Midfielder		Wide Midfielder		Forward	
	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over
D	8922	7723	8953	8759	9128	9240	8274	9585	7042	8201
Drel	95	81	94	92	96	97	91	100	125	86
AMP	8,64	7,53	8,88	8,57	8,86	8,98	8,55	9,26	11,94	7,86
D_SHI	1042	704	1535	1107	1132	1028	1230	1370	1164	938
D_AccHI	406	398	533	461	484	441	495	440	454	375
D_DecHI	375	408	473	469	426	471	437	478	442	399
D_MPHI	2083	1547	2469	2097	2272	2204	1962	2399	1807	1700
%D_SHI	11,51	9,05	17,08	12,41	12,12	11,06	15,79	14,16	27,61	11,34
%D_AccHI	4,56	5,18	5,95	5,23	5,25	4,78	6,36	4,56	10,61	4,56
%D_DecHI	4,19	5,28	5,29	5,34	4,62	5,12	5,62	4,94	10,35	4,88
%D_MPHI	23,14	19,95	27,44	23,79	24,59	23,76	25,23	24,90	42,61	20,66

Table 3 – Average of Performance Parameters divided by Category and Positions

Positions/Category										
Parameters	Centre Back		Full Back		Centre Midfield		Wide Midfield		Forward	
	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over
D_S1	2520	2882	2728	2727	2400	2588	3257	2731	2589	3027
D_S2	3038	2582	2405	2881	3017	3135	2080	2982	1787	2554
D_S3	2322	1555	2284	2044	2579	2488	1706	2501	1501	1682
D_S4	747	511	983	677	779	730	664	871	605	601
D_S5	253	155	446	303	283	256	372	371	398	234
D_S6	42	39	107	128	70	43	194	128	161	103

Table 4 – Average of Speed Threshold Parameters divided by Category and Positions

Average Minutes Played		
Positions	OVER 20	UNDER 20
Cent. Back	95	90
Full Back	95	94
Cent. Mid.	95	95
Wide Mid.	95	95
Forw.	95	75

Table 5 – Average Minutes Played divided by Category and Positions

UNDER 20									
Parameters	Cent. Back		Full Back		Cent. Mid.		Wide Mid.		Forw.
D	↑	8922	↑	8953	↑	9128	→	8274	↓	7042
Drel	↓	95	↓	94	↓	96	↓	91	↑	125
AMP	↓	8,64	↓	8,88	↓	8,86	↓	8,55	↑	11,94
D_SHI	↓	1042	↑	1535	↓	1132	→	1230	↓	1164
D_AccHI	↓	406	↑	533	→	484	↑	495	→	454
D_DecHI	↓	375	↑	473	→	426	→	437	↑	442
D_MPHI	→	2083	↑	2469	↑	2272	↓	1962	↓	1807
%D_SHI	↓	11,51	→	17,08	↓	12,12	↓	15,79	↑	27,61
%D_AccHI	↓	4,56	↓	5,95	↓	5,25	↓	6,36	↑	10,61
%D_DecHI	↓	4,19	↓	5,29	↓	4,62	↓	5,62	↑	10,35
%D_MPHI	↓	23,14	↓	27,44	↓	24,59	↓	25,23	↑	42,61

Table 6 – Average of UNDER 20 Performance Parameters divided by Positions

OVER 20									
Parameters	Cent. Back		Full Back		Cent. Mid.		Wide Mid.		Forw.
D	↓	7723	→	8759	↑	9240	↑	9585	↓	8201
Drel	↓	81	→	92	↑	97	↑	100	↓	86
AMP	↓	7,53	→	8,57	↑	8,98	↑	9,26	↓	7,86
D_SHI	↓	704	→	1107	→	1028	↑	1370	→	938
D_AccHI	↓	398	↑	461	↑	441	↑	440	↓	375
D_DecHI	↓	408	↑	469	↑	471	↑	478	↓	399
D_MPHI	↓	1547	→	2097	↑	2204	↑	2399	↓	1700
%D_SHI	↓	9,05	→	12,41	→	11,06	↑	14,16	→	11,34
%D_AccHI	↑	5,18	↑	5,23	↓	4,78	↓	4,56	↓	4,56
%D_DecHI	↑	5,28	↑	5,34	→	5,12	↓	4,94	↓	4,88
%D_MPHI	↓	19,95	↑	23,79	↑	23,76	↑	24,90	↓	20,66

Table 7 – Average of OVER 20 Performance Parameters divided by Positions

UNDER 20									
Parameters	Cent. Back		Full Back		Cent. Mid.		Wide Mid.		Forw.
D_S1	↓	2520	→	2728	↓	2400	↑	3257	↓	2589
D_S2	↑	3038	→	2405	↑	3017	↓	2080	↓	1787
D_S3	↑	2322	↑	2284	↑	2579	↓	1706	↓	1501
D_S4	→	747	↑	983	→	779	↓	664	↓	605
D_S5	↓	253	↑	446	↓	283	→	372	↑	398
D_S6	↓	42	→	107	↓	70	↑	194	↑	161

Table 8 – Average of UNDER 20 Speed Threshold Parameters divided by Positions

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OVER 20								
Parameters	Cent. Back		Full Back		Cent. Mid.		Wide Mid.	Forw.
D_S1	→	2882	↓	2727	↓	2588	↓ 2731	↑ 3027
D_S2	↓	2582	→	2881	↑	3135	↑ 2982	↓ 2554
D_S3	↓	1555	→	2044	↑	2488	↑ 2501	↓ 1682
D_S4	↓	511	→	677	→	730	↑ 871	↓ 601
D_S5	↓	155	↑	303	→	256	↑ 371	→ 234
D_S6	↓	39	↑	128	↓	43	↑ 128	↑ 103

Table 9 – Average of OVER 20 Speed Threshold Parameters divided by Positions

Later we compared the parameters measured between category divided for positions, as showed in the following tables (Table 10,11,12,13 and 14).

In the end we calculate the total average of all the data obtained from both categories (Table 15).

Central Back																	
Category	D	Drel	AMP	D_SHI	D_AccHI	D_DecHI	D_MPHI	%D_SHI	%D_AccHI	%D_DecHI	%D_MPHI	D_S1	D_S2	D_S3	D_S4	D_S5	D_S6
Under	↑ 8922	↑ 95	↑ 8,64	↑ 1042	↑ 406	↓ 375	↑ 2083	↑ 11,51	↓ 4,56	↓ 4,19	↑ 23,14	↓ 2520	↑ 3038	↑ 2322	↑ 747	↑ 253	↑ 42
Over	↓ 7723	↓ 81	↓ 7,53	↓ 704	↓ 398	↑ 408	↓ 1547	↓ 9,05	↑ 5,18	↑ 5,28	↓ 19,95	↑ 2882	↓ 2582	↓ 1555	↓ 511	↓ 155	↓ 39

Table 10 – CB Average Parameters divided by Category

Full Back																	
Category	D	Drel	AMP	D_SHI	D_AccHI	D_DecHI	D_MPHI	%D_SHI	%D_AccHI	%D_DecHI	%D_MPHI	D_S1	D_S2	D_S3	D_S4	D_S5	D_S6
Under	↑ 8953	↑ 94	↑ 8,88	↑ 1535	↑ 533	↑ 473	↑ 2469	↑ 17,08	↑ 5,95	↓ 5,29	↑ 27,44	↑ 2728	↓ 2405	↑ 2284	↑ 983	↑ 446	↓ 107
Over	↓ 8759	↓ 92	↓ 8,57	↓ 1107	↓ 461	↓ 469	↓ 2097	↓ 12,41	↓ 5,23	↑ 5,34	↓ 23,79	↓ 2727	↑ 2881	↓ 2044	↓ 677	↓ 303	↑ 128

Table 11 – FB Average Parameters divided by Category

Central Midfielder																	
Category	D	Drel	AMP	D_SHI	D_AccHI	D_DecHI	D_MPHI	%D_SHI	%D_AccHI	%D_DecHI	%D_MPHI	D_S1	D_S2	D_S3	D_S4	D_S5	D_S6
Under	↓ 9128	↓ 96	↓ 8,86	↑ 1132	↑ 484	↓ 426	↑ 2272	↑ 12,12	↑ 5,25	↓ 4,62	↑ 24,59	↓ 2400	↓ 3017	↑ 2579	↑ 779	↑ 283	↑ 70
Over	↑ 9240	↑ 97	↑ 8,98	↓ 1028	↓ 441	↑ 471	↓ 2204	↓ 11,06	↓ 4,78	↑ 5,12	↓ 23,76	↑ 2588	↑ 3135	↓ 2488	↓ 730	↓ 256	↓ 43

Table 12 – CM Average Parameters divided by Category

Wide Midfielder																	
Category	D	Drel	AMP	D_SHI	D_AccHI	D_DecHI	D_MPHI	%D_SHI	%D_AccHI	%D_DecHI	%D_MPHI	D_S1	D_S2	D_S3	D_S4	D_S5	D_S6
Under	↓ 8274	↓ 91	↓ 8,55	↓ 1230	↑ 495	↓ 437	↓ 1962	↑ 15,79	↑ 6,36	↑ 5,62	↑ 25,23	↑ 3257	↓ 2080	↓ 1706	↓ 664	↑ 372	↑ 194
Over	↑ 9585	↑ 100	↑ 9,26	↑ 1370	↓ 440	↑ 478	↑ 2399	↓ 14,16	↓ 4,56	↓ 4,94	↓ 24,90	↓ 2731	↑ 2982	↑ 2501	↑ 871	↓ 371	↓ 128

Table 13 – WM Average Parameters divided by Category

Forward																	
Category	D	Drel	AMP	D_SHI	D_AccHI	D_DecHI	D_MPHI	%D_SHI	%D_AccHI	%D_DecHI	%D_MPHI	D_S1	D_S2	D_S3	D_S4	D_S5	D_S6
Under	↓ 7042	↑ 125	↑ 11,94	↑ 1164	↑ 454	↑ 442	↑ 1807	↑ 27,61	↑ 10,61	↑ 10,35	↑ 42,61	↓ 2589	↓ 1787	↓ 1501	↑ 605	↑ 398	↑ 161
Over	↑ 8201	↓ 86	↓ 7,86	↓ 938	↓ 375	↓ 399	↓ 1700	↓ 11,34	↓ 4,56	↓ 4,88	↓ 20,66	↑ 3027	↑ 2554	↑ 1682	↓ 601	↓ 234	↓ 103

Table 14 – FO Average Parameters divided by Category

Total Average		
Parameters	Under	Over
D	↓ 8464	↑ 8702
Drel	↑ 100	↓ 91
AMP	↑ 9,37	↓ 8,44
D_SHI	↑ 1221	↓ 1030
D_AccHI	↑ 474	↓ 423
D_DecHI	↓ 431	↑ 445
D_MPHI	↑ 2118	↓ 1990
%D_SHI	↑ 16,82	↓ 11,60
%D_AccHI	↑ 6,55	↓ 4,86
%D_DecHI	↑ 6,01	↓ 5,11
%D_MPHI	↑ 28,60	↓ 22,61
D_S1	↓ 2699	↑ 2791
D_S2	↓ 2466	↑ 2827
D_S3	↑ 2079	↓ 2054
D_S4	↑ 755	↓ 678
D_S5	↑ 350	↓ 264
D_S6	↑ 115	↓ 88

Table 15 – Total Average of Parameters for Category

Discussion

The purpose of the study was to identify performance parameters of the two categories, take in consideration the players positions, and to search indexes that could differentiate, or not, the performance between an over 20 to an under 20.

In order to better understand the data, Table 5 shows the average minutes played for each filed position, this because obviously substitutions effectuated from the coach during the analysed matches can directly modified the PPM. Table 3 and 4 shows all the registered parameters divided by positions and category, by the colours is easy to read and analyse the data. (Bangsbo J, 2006)

We found that for both categories the position that shows lower values in high intensity run (D_SHI, D_AccHI, D_DecHI) were the CB. In the over 20 the FO shows all the parameters under the average, and more specify in the Dacha and %D_AccHI. The positions that shows higher parameters were the under 20 FB (D_SHI, D_AccHI, D_DecHI and D_MPHI) under 20 FO (Drel, AMP, %D_SHI, %D_AccHI, %D_DecHI and %D_MPHI) and over 20 WM (D, D_SHI, D_DecHI and D_MPHI).

About speed thresholds comparison, Table 4 shows, that the over 20 CB have the lower values in high intensity parameter that are D_S3, D_S4, D_S5 and D_S6. The categories and the field positions that shows higher values in high intensity speed thresholds parameters are the under 20 FB (D_S4, D_S5), the over and under 20 WM (D_S5, D_S6) and the under 20 FO (D_S6). Through the investigation it has been found, that in the under 20 (Table 6), the role with few travelled distance (D), is the FO, while the role with high D, is CM. About Drel and AMP parameters only FO shows highs values, the other roles have more or less the same data, this parameter is correlated with played time, and this is mean the FO are substituted more and soon then the other players during the analysed matches. In the under 20 the FB position shows highest value in D_SHI, D_AccHI, D_DecHI, and D_MPHI, and the FO in %D_SHI, %D_AccHI, %D_DecHI, and %D_MPHI. The CB shows few travelled distance in D_SHI, D_AccHI, D_DecHI, %D_SHI, %D_AccHI, %D_DecHI, and %D_MPHI.

Regarding the over 20 category (Table 7), the role that shows the high values in D, is the WM, and the field position that shows the fewest, D, is the CB. About the Drel and AMP parameters the highest values was reached by the WM, and the lower was registered by CB. The over 20 WM shows even the highest values in D_SHI, D_AccHI, D_DecHI, D_MPHI, %D_SHI and %D_MPHI. At least FB shows the higher values in %D_AccHI and %D_DecHI.

The data from speed thresholdsare showed in Tables 9 and 10. In the under 20: WM, shows highest value in D_S1 and D-S6, CB, shows highest value in D_S2, CM, shows highest value in D_S3 and FB, shows highest values in D_S4 and D_S5. In the over 20: FO shows highest distance travelled in D_S1, CM shows highest distance travelled in D_S2 and D_S3, WM shows highest distance travelled in D_S4, D_S5, FB and WM shows the same highest distance travelled value in D_S6.

In the both category the CB shows lower distance travelled in highest speed thresholds D_S5 and D_S6, and the WM shows higher distance travelled in D_S6. Tables 10,11,12,13 and 14 shows and compare average data from both group divided for field positions. (Ferro A, Villacieros J, Floria P, Graupera JL, 2014)

About CB position (Table 10), the under 20 shows higher values in all the parameters except D_DecHI, %D_AccHI, %D_DecHI and D_S1.

In FB position (Table 10), under 20 shows higher values in all the parameters except %D_DecHI, D_S2 and D_S6.

In CM position (Table 12), the over 20 shows, higher values in D, Drel, D_DecHI, AMP, D_S1 and D_S2. In the same category the under 20 shows higher values, in almost all of the high intensity parameters that are D_SHI, D_AccHI, D_MPHI, %D_SHI, %D_AccHI, %D_MPHI, D_S3, D_S4, D_S5 and D_S6.

About WM position (table 13) the over 20 shows higher values in all quantitative parameters except D_AccHI. The AMP value is higher in over 20 but all of the percentage parameters is higher in under 20. About the speed thresholds under 20 shows higher values in D_S1, D_S5 and D_S6, and over 20 in D_S3 and D_S4.

In FO position (table 14) under 20 have higher values in Drel, D_SHI, D_AccHI, D_DecHI, D_MPHI, AMP, %D_SHI, %D_AccHI, %D_DecHI, %D_MPHI, D_S4, D_S5 and D_S6. Over 20 have better values in D, D_S1, D_S2 and D_S3.

The Table 15 shows the average data for both category, this is useful to understand which category produced higher value for all the parameters token in exam. The over 20 shows higher values in D, D_DecHI, D_S1 and D_2, in the all other parameters the under 20 shows higher values.

Conclusions

The purpose of the study was to investigate the physical performance indexes of amateur players under and over 20 years old for each field positions, through the use of the GPS system 20Hz. The evaluation of the data was possible via K-Fitness software.

Over 20 travelled in average more D, but more of the total distance was travelled in slow intensity, in fact they shows the higher values in D_S1 and D_S2. Otherwise over 20 shows in average better values in high intensity parameters.

Talking about field positions the Midfielders shows higher values in total distance for both groups, the field positions are CM for under 20 and WM for over 20. The over 20 WM shows the higher parameters in high intensity for is category, and the CB have the lower. For the under 20 category are the FB that shows the higher values in high intensity, like the over 20 even in the under 20 the CB have the worst values.

The evaluation about percentage parameters for both category have to be consider taking a lot at the minutes played (Table 5), this because the coach substitutions obviously can influence the values. In our case the under 20 FO parameters are influenced with the average of 75 minutes played, so the percentage parameters takes the higher values in FO but only correlated with this.

In order to better, define the PPM we wish to have the chances in future to differentiate the parameters with time played, to evaluate games without substitutions or to modify the protocol. At least is possible to say that in amateur contest the under 20 travelled more distance in high intensity during a game, this obviously is correlated with average ages that in a under 20 team is controlled and homogenous.

In our study the total distance travelled is higher in over 20 but this data is influence by the detected average minutes played that is lower in the over 20 because of the coach substitutions. Future approaches could be: differentiate players position even for minutes played, detect an entire season for under 20 and over 20 groups in order to evaluate a size of data less influence by case, evaluate even the entering substitute players and correlated this data with professional under 20 and over 20 teams. The detection of PPM helps to increase the quality of the training schedule, furthermore differentiate the PPM even for category and field position, can make more specific and accurate the work of the coaches and fitness trainer.

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