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ORIGINAL

SPORT PERFORMANCE INDICATORS IN FOOTBALL 7-A-SIDE FOR PEOPLE WITH CEREBRAL PALSY

INDICADORES DE RENDIMIENTO DEPORTIVO EN EL FÚTBOL-7 PARA PERSONAS CON PARÁLISIS CEREBRAL

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ABSTRACT

The aim of the study is determining performance indicators that influence in the results of shot on goal in football 7-a-side for persons with cerebral palsy (Fa7CP). The sample was composed of all shots on goal executed during twelve matches of different competition phases of the Fa7PC Paralympic Games in London 2012. The results show a high number of shots, especially in the last minutes of the match. Best-ranked teams are the most throwers and front players with more functional capacity (CP8) have the biggest offensive weight, despite not being more effective than other players. Right foot and instep are the most used areas to shot on goal, which more frequently have low trajectories, develop with the close opposition and from the field central areas.

The launch with the highest probability of success is executed from Zone 2, 3 or 6, with the inside of the foot, a low height and without defensive opposition or only in front of the goalkeeper.

KEY WORDS: football 7-a-side, disability, Paralympic Games, performance indicator, match analysis.

RESUMEN

El presente estudio pretende determinar los indicadores de rendimiento que influyen en el lanzamiento a portería en fútbol a 7 para personas con parálisis cerebral (Fa7PC). La muestra está compuesta por los lanzamientos de doce partidos seleccionados aleatoriamente de la competición de Fa7PC de los Juegos Paralímpicos de 2012. Los resultados un número elevado de lanzamientos, sobre todo en los últimos minutos del partido, siendo los equipos mejor clasificados los que realizan más. Los jugadores que más lanzan son los delanteros con más capacidad funcional (CP8), a pesar de no ser más efectivos que el resto. El pie derecho y el empeine son las zonas más utilizadas, con trayectorias bajas, oposición cercana y desde zonas centrales del campo.

El lanzamiento con mayor probabilidad de éxito se realiza desde Zona 2, 3 o 6, con el interior del pie, una altura baja y sin oposición defensiva o sólo frente al portero.

PALABRAS CLAVE: fútbol a 7, discapacidad, Juegos Paralímpicos, indicador de rendimiento, análisis de juego.

INTRODUCTION

Cerebral palsy (CP) refers to a permanent disorder of movement and posture due to a non-developmental lesion of the central nervous system (Boyd & Graham, 1999). Depending on CP type and severity, the body function or structure may be affected (Kloyiam, Breen, Jakeman, Conway & Hutzler, 2011). Thus, there exist several types of CP depending on the degree of motor affectation, spasticity (García-Ribés, 2004) and muscular weakness (Bruyère, VanLooy & Peterson, 2005) being the most frequent ones. One of the most popular sport modalities among people with CP is football 7-a-side or cerebral palsy football (CPF), very similar to football for able-bodied players (CPISRA, 2014). In this sport modality, there are seven players per team on the field at a time and matches consist of two halves of thirty minutes, with a break of ten minutes between them. There is no offside rule in the last 13 meters to the goal line and throw-ins may be made with just one hand (IFCPF, 2016).

To be allowed to compete, players must have a minimum degree of impairment, as defined by the different organisations, that hinders their participation in a normalised sport (Tweedy & Valandewijck, 2011). With the aim to minimise the impact of the player's impairment on competition, CPISRA (Cerebral Palsy International Sports and Recreation Association) developed a functional classification system containing eight classes: four classes (C1-C4) for wheelchair athletes and four (C5-C8) for ambulant athletes (Reina, 2014). The last four classes include the athletes eligible to play football.

Research studies on CPF are recent and scarce in the scientific literature. Roquetti and Fernandes (2004) analysed the dermatoglyphics, somatotype and maximum oxygen consumption of the Brazilian CPF national team athletes. Andrade, Fleury and Silva (2005) analysed the Brazilian Paralympic football team and revealed that muscle weakness, strength asymmetry and imbalance of the antagonist muscles are the major risk factors of injury. Yanci et al., (2014) assessed squat jump and countermovement jump height in CPF players and analysed the relationships of anthropometric variables and functional class with flight time. Nevertheless, no scientific work has been found concerning CPF-specific sport performance indicators.

The analysis of performance indicators has emerged recently and has gained popularity among sport scientists and practitioners in a short period of time (Drust, 2010). It is a method to record and analyse the sport context (Hughes & Franks, 2004) that allows for providing optimal quantitative and qualitative feedback, as well as relevant data for the analysed sport (Hughes & Franks, 2008). Its main aim is to identify strengths that may be developed with training and weaknesses that may be improved before competition. Likewise, the analysis of the opponent's performance may be used to counter their strengths and take advantage of their weaknesses (Lago, 2008). Thus, a performance indicator is a selection or combination of movement variables that has the purpose to define some or all performance aspects within a sport context (Hughes & Bartlett, 2008).

These indicators form an ideal performance profile, which must be present in the sport activity in order to achieve a high performance level and may be used as a way of predicting the future of sport activities (O'Donoghue, 2010). This kind of analysis has been applied to sports for the disabled, such as in the study by Molik, Kosmol, Morgulec-Adamowicz, Laskin, Jezior and Patrzatek (2009), who analysed game efficiency in wheelchair basketball, or in the study by Morato, Da Cunha, Gamero, Magalhães and Almeida (2017), who developed and evaluated an observational system for goalball match analysis. Besides, there are a large number of studies concerning performance indicators in sports for the able-bodied that focus on the game process. Ibáñez, Lozano and Martínez (2001), for example, analysed the shot in basketball, while Manzano, Pacheco and Lorenzo (2006) studied the pass and Mendes and Tavares (2004) focused on defence. The observational methodology was used in all these works in order to collect accurate information.

Following Ibáñez, García, Feu, Parejo and Cañada (2009), the basketball shot has been studied in the last years with the intent to determine its relationships and importance within the game. Some of the variables used in performance analysis studies have been throwing area and player position (Tsitskaris, Theoharopoulos, Galanis & Nikopoulou, 2002) or defensive pressure and player's skill level (Ibáñez et al., 2001). Nonetheless, the studies that have assessed shooting effectiveness alone are scarce (Ibáñez et al., 2007; Ibáñez et al., 2009; Piñero, 2008; Prieto, Pérez & Gómez, 2013; Tsitskaris et al., 2002).

On the other hand, Lago, Casáis, Domínguez, Lago and Rey (2009) confirmed that the context variables that most affect performance in football are: match location, provisional score and opponent's level. However, team sports always contain a random and unpredictable component (Lago, 2005). Nonetheless, several studies have proved that the winning teams in competitions and tournaments are those who reach a higher average number of total shots, shots on goal and higher shooting effectiveness (Armatas et al., 2009; Casáis, Lago, Lago, Iglesias & Gómez, 2011; Szwarc, 2004).

These studies allow for observation of the behaviours that affect sport performance with good quality, reliability, validity and accuracy (Salas & Hernández-Mendo, 2016), and for the analysis concurrent with a specific phase of the study (Hileno & Buscá, 2012). This coincides with one of the most relevant aspects of sport performance analysis, which is no other than showing the study's ability to yield significant results regarding the research context through accurate recording of the previously defined variables.

Therefore, considering the aforementioned facts, the general aim of this research was to determine the possible contextual factors that affect the performance of players of football 7-a-side for the disabled, using shot outcome as main performance indicator. To do so, the general aim materialises into two specific aims: i) to describe the sport modality of elite CPF, and ii) to conduct a descriptive and inferential analysis to determine the relationship between the dependent and independent variables of the study.

METHOD

Design

A qualitative-descriptive research design was proposed for the present study (Montero & León, 2007). The observational methodology was applied and the data was collected using notational analysis.

Sample

The sample was composed of all the shots (n=444) performed in twelve matches randomly selected from the different CPF competition phases of the London 2012 Paralympic Games (Table I).

Table I. Descriptive analysis of the variable *Match*.

Match	*Phase*	*Number of shots*	*Percentage*
Argentina – Iran	Group phase (Group 1)	39	8.8
Argentina – Netherlands	Group phase (Group 1)	34	7.7
Iran – Russia	Group phase (Group 1)	39	8.8
Russia – Netherlands	Group phase (Group 1)	29	6.5
Brazil – Ukraine	Group phase (Group 2)	34	7.7
Great Britain – Brazil	Group phase (Group 2)	25	5.6
Great Britain – Ukraine	Group phase (Group 2)	53	11.9
USA – Brazil	Group phase (Group 2)	46	10.4
USA – Great Britain	Group phase (Group 2)	35	7.9
Brazil – Iran	Third and fourth place match	46	10.4
Netherlands – Argentina	Fifth and sixth place match	20	4.5
USA – Great Britain	Seventh and eighth place match	44	9.9
Total shots		444	100.0

Variables

The procedure proposed by Anguera and Mendo (2013), based on interviews to experts (national and international-level Spanish CPF coaches), was used to build the category system for the analysis, with the aim to establish which actions were regarded as decisive (Table II).

Table II. List of variables and categories of the CPF study.

Variables	*Categories*							
Functional class	CP5	CP6	CP7	CP8				
n	15	9	243	177				
%	3.4	2.0	54.7	39.9				
Player position	Forward	Midfielder	Defender	Goalkeeper				
n	130	199	115	0				
%	29.3	44.8	25.9	0.0				
Body segment	Right foot	Left foot	Head	Other				
n	251	164	24	5				
%	56.5	36.9	5.4	1.1				
Hitting type	Foot inside	Foot instep	Foot toe	Foot outside	Foot heel	Head frontal	Head lateral	Other
n	104	223	73	12	4	16	2	10
%	23.4	50.2	16.4	2.7	0.9	3.6	0.5	2.3
Shooting situation	After control	Directly						
n	243	201						
%	54.7	45.3						
Shooting height	Low	Medium	High					
n	209	98	137					
%	47.1	22.1	30.9					
Opposition	No oppos.	Goalkeeper	Far oppos.	Close oppos.				
n	11	87	143	203				
%	2.5	19.6	32.2	45.7				
Playing situation	Cont. playing	Penalty kick	Free kick					
n	408	1	35					
%	91.9	0.2	7.9					
Outcome	Goal	On goal	Out	Other				
n	63	117	147	117				
%	14.2	26.4	33.1	26.4				

Oppos.: opposition; Cont.: Continuous.

Moreover, the following variables were recorded: *Team*, with the categories: Argentina, Brazil, Great Britain, Iran, Netherlands, Russia, Ukraine and USA; *Field zone*, defined by an *ad-hoc* division of the field (Figure I); and *Time*, with the following intervals: 0 min to 9 min 59 s, 10 min to 19 min 59 s, 20 min to 29 min 59 s, 30 min to 39 min 59 s, 40 min to 49 min 59 s, 50 min to 60 min, extra time and penalty shoot-out. All variables were used for the performance indicator analysis (O'Donoghue, 2010).

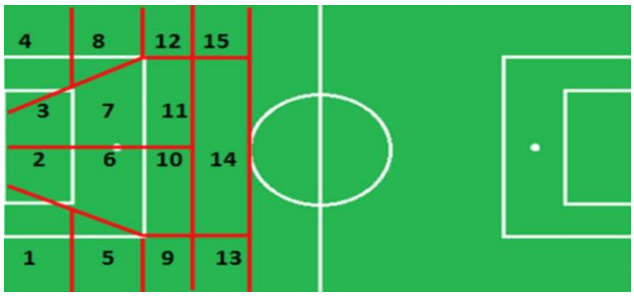

Figure I. Field division used for the variable *Field zone*.

Procedure

The construction, design and validation of an observational tool in Physical Activity and Sport Sciences entail a methodical and organised procedure (Gamonales, León, Muñoz, González & Ibáñez, 2018). Therefore, the research process was divided into four phases: preparation, training and data reliability assessment, data collection and, lastly, statistical analysis.

Planning, treatment, organisation and management of the necessary information, including the selection of the tools to be used in each research phase, were conducted during the preparation phase. The design of the observation training was also included in this phase (Villarejo, Ortega, Gómez & Palao, 2014). After completing the training, intra-observer reliability was calculated for the collected data.

Reliability

Thirteen shots were randomly selected from six matches and recorded twice, one week apart (Wheeler, Askew & Sayers, 2010). A statistical procedure adapted from Kappa's coefficient (Cohen, 1960), called *Multirater Kappa Free* (Randolph, 2005), was applied for the reliability analysis. A strength of agreement of $\kappa>0.88$ was obtained for all the study variables, which may be considered as "perfect" for repeated measures (O'Donoghue, 2010).

Once the data reliability was confirmed, twelve matches were coded. They had been randomly chosen among the twenty matches played in the different CPF competition phases of the London 2012 Paralympic Games; this means the sixty per cent of the analysis unit.

Statistical analysis

After data collection, a descriptive analysis including frequencies and percentages was conducted. Subsequently, and because the data was obtained from categorical variables, non-parametric mathematical models were applied for hypothesis testing to estimate the association among variables. In particular, Chi-squared (X^2) and Cramer's Phi coefficient (φc) were used. The strength of association given by Cramer's φc was interpreted following Crewson's (2006) proposal and by means of adjusted standardised residuals (ASR, |1.96|) from contingency tables (Pardo, 2002).

RESULTS

The descriptive analysis showed that between 20 and 40 shots were performed in most of the CPF matches of London 2012 Paralympic Games. The mean shots per match revealed that there were three teams who shot less than the rest (Argentina: *n*=11, Netherlands: *n*=10.66 and USA: *n*=10), two teams who performed a similar number of shots (Great Britain: *n*=18.5 and Iran: *n*=18.3) and three teams who shot more than the rest (Ukraine: *n*=30.5, Russia: *n*=27.5 and Brazil: *n*=26). Regarding the variable *Functional class*, it is noteworthy that the players classified as CP7 (*n*=243) were the ones who performed the highest number of shots, followed by CP8 players (*n*=177), while CP5 and CP6 players performed a lower number of shots (Figure I).

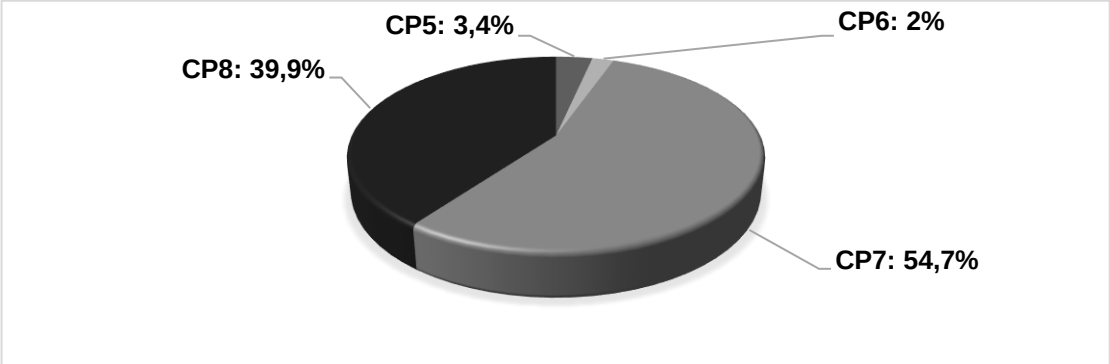

Figure I. Percentage of shots per functional class.

With regard to the variable *Time*, the lapse of time in which fewest shots occurred was the first ten minutes of the match (*n*=48), while the highest number of shots occurred in the last ten minutes (*n*=95). Between 64 and 83 shots were recorded in the other 10-minute intervals. Only 7 shots were performed in the extra time. The midfielders were the players who completed the highest number of shots (*n*=199), followed by the forwards (*n*=130) and, finally, the defenders (*n*=115). Furthermore, the results showed that zone 14 was the most chosen shooting zone (*n*=123), followed by zones 6, 7, 10 and 11. Between 4 and 13 shots occurred in the other field zones (Figure II).

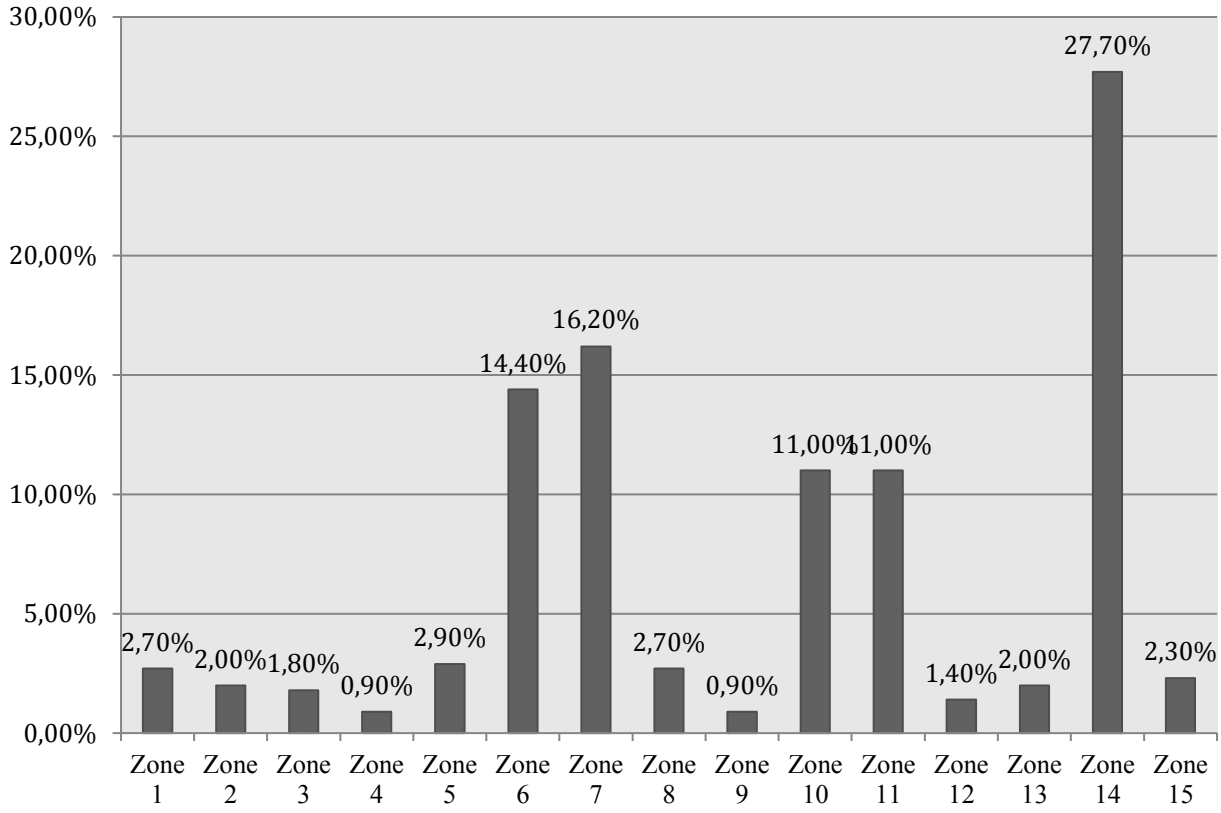

Figure II. Percentage of shots per field zone.

With regard to the variable *Body segment*, the right foot was used to perform most of the shots (*n*=251), followed by the left foot (*n*=164), the head (*n*=24) and, finally, other body segments (*n*=5). Figure III shows the main hitting types chosen by players with cerebral palsy.

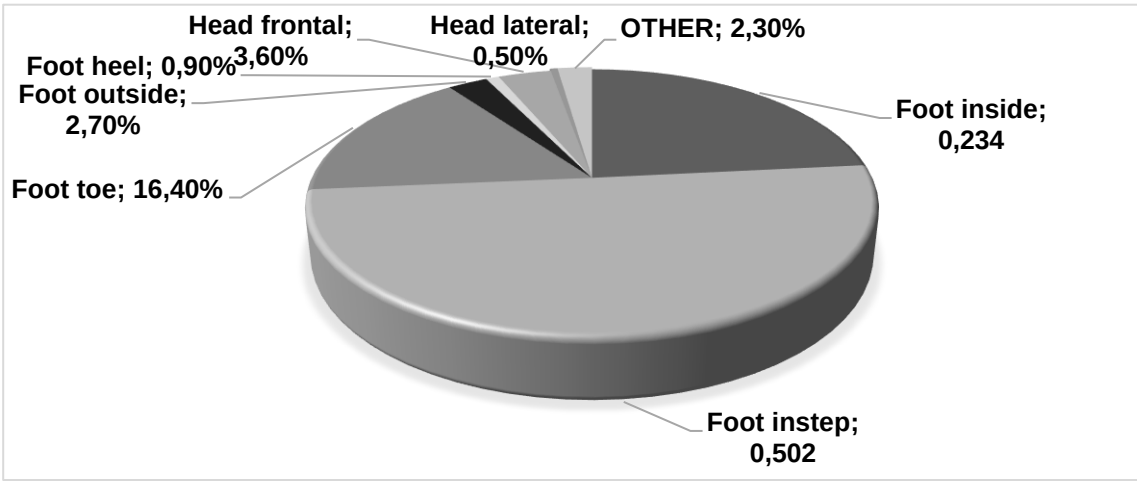

Figure III. Percentage of shots per hitting type.

The variable *Shooting situation* revealed that players controlled the ball before shooting (*n*=243). As regards *Shooting height*, there were fewer low shots (*n*=209) than high (*n*=137) or medium-height shots (*n*=98). The least frequent opposition type when shooting was the absence of opposition (*n*=11), followed by only the goalkeeper's opposition (*n*=87), far opposition (*n*=143) and close

opposition (*n*=203). Regarding the *Playing situation*, most shots occurred during continuous playing (*n*=408), a few of them were free kicks (*n*=35) and only one was a penalty kick (*n*=1).

Finally, the variable *Outcome* yielded large variability (Figure IV), with 26.4% of shots on goal and 14.2% of goals scored.

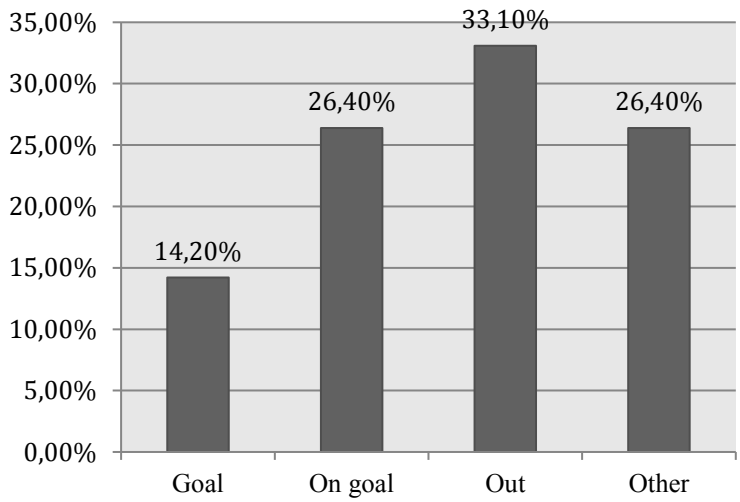

Figure IV. Shooting outcome.

The results of the inferential analysis concerning the association among variables are displayed in Table V. Five variables showed significant association: *Field zone*, *Hitting type*, *Shooting height*, *Opposition* and *Outcome*, with moderate strength of association (*φc*>0.300 and <0.499*)*, and *Playing situation*, with low strength of association (*φc*>0.100 and <0.299*)* (Crewson, 2006). Conversely, no significant relationship was found with the other variables: *Match*, *Team*, *Functional class*, *Time*, *Player position*, *Body segment* or *Shooting situation*.

Table III. Relationship between the variable *Outcome* and the independent variables.

	London 2012 Paralympic Games					
Related variables	χ^2	df	Sig.		*φc*	Sig.
Outcome / Match	43.403	33	0.106		0.313	0.106
Outcome / Team	29.798	21	0.096		0.259	0.096
Outcome / Functional class	15.270	9	0.084		0.185	0.084
Outcome / Time	19.301	18	0.374		0.208	0.374
Outcome / Player position	3.734	6	0.713		0.092	0.713
Outcome / Field zone	90.289	42	0.000	*	0.451	0.000
Outcome / Body segment	9.599	9	0.384		0.147	0.384
Outcome / Hitting type	43.147	21	0.003	*	0.312	0.003
Outcome / Shooting situation	7.508	3	0.057		0.130	0.057
Outcome / Shooting height	62.181	6	0.000	*	0.374	0.000
Outcome / Opposition	82.090	9	0.000	*	0.430	0.000
Outcome / Playing situation	24.662	6	0.000	*	0.236	0.000

* $\chi^2 \leq 0.05$ There is a relationship between these variables.

The results revealed moderate strength of association (*φc*=0.451) between the variables *Outcome* and *Field zone* (χ^2=90.289, *p*<0.05). When analysed in detail, and as shown in Table IV, the probability that shots performed in zone 1 went out of the goal was higher than expected (*ASR*=2.5, *n*=8, *EF*=4.0), while the probability of other outcomes was lower than expected (*ASR*=-2.1, *n*=0, *EF*=3.2). Besides, there was higher probability than expected that shots coming from zones 2, 3 and 6 ended in a goal (*ASR*=2.6, *n*=4, *EF*=1.3; *ASR*=2.9, *n*=4, *EF*=1.1 and *ASR*=3.1, *n*=17, *EF*=9.1, respectively) and lower probability than expected that shots went out of the goal when coming from zone 6 (*ASR*=-2.4, *n*=13, *EF*=21.2). As regards zone 9, higher probability than expected of obtaining other outcomes was observed (*ASR*=2.2, *n*=3, *EF*=1.1). Finally, there was lower probability than expected of scoring a goal (*ASR*=-3.8, *n*=5, *EF*=17.5) or throwing the ball out of the goal (*ASR*=-2.2, *n*=31, *EF*=40.7) from zone 14, while there was higher probability than expected that other outcomes occurred when shooting from this zone (*ASR*=3.8, *n*=48, *EF*=32.4).

Table IV. Relationship between the variables *Outcome* and *Field zone*.

		Outcome				
Field zone		Goal	On goal	Out	Other	Total
Zone 1	n	2	2	8	0	12
	EF	1.7	3.2	4.0	3.2	12.0
	ASR	0.2	-0.8	**2.5***	**-2.1***	
Zone 2	n	4	2	1	2	9
	EF	1.3	2.4	3.0	2.4	9.0
	ASR	**2.6***	-0.3	-1.4	-0.3	
Zone 3	n	4	3	1	0	8
	EF	1.1	2.1	2.6	2.1	8.0
	ASR	**2.9***	0.7	-1.2	-1.7	
Zone 4	n	1	2	1	0	4
	EF	0.6	1.1	1.3	1.1	4.0
	ASR	0.6	1.1	-0.3	-1.2	
Zone 5	n	1	6	5	1	13
	EF	1.8	3.4	4.3	3.4	13.0
	ASR	-0.7	1.6	0.4	-1.5	
Zone 6	n	17	21	13	13	64
	EF	9.1	16.9	21.2	16.9	64.0
	ASR	**3.1***	1.3	**-2.4***	-1.2	
Zone 7	n	15	17	27	13	72
	EF	10.2	19.0	23.8	19.0	72.0
	ASR	1.8	-0.6	0.9	-1.7	
Zone 8	n	0	4	4	4	12
	EF	1.7	3.2	4.0	3.2	12.0
	ASR	-1.4	0.6	0.0	0.6	
Zone 9	n	0	0	1	3	4
	EF	0.6	1.1	1.3	1.1	4.0
	ASR	-0.8	-1.2	-0.3	**2.2***	
Zone 10	n	6	8	21	14	49
	EF	7.0	12.9	16.2	12.9	49.0
	ASR	-0.4	-1.7	1.5	0.4	
Zone 11	n	6	10	20	13	49

	EF	7.0	12.9	16.2	12.9	49.0
	ASR	-0.4	-1.0	1.2	0.0	
Zone 12	n	1	0	4	1	6
	EF	0.9	1.6	2.0	1.6	6.0
	ASR	0.2	-1.5	1.8	-0.5	
Zone 13	n	0	1	5	3	9
	EF	1.3	2.4	3.0	2.4	9.0
	ASR	-1.2	-1.0	1.4	0.5	
Zone 14	n	5	39	31	48	123
	EF	17.5	32.4	40.7	32.4	123.0
	ASR	**-3.8***	1.6	**-2.2***	**3.8***	
Zone 15	n	1	2	5	2	10
	EF	1.4	2.6	3.3	2.6	10.0
	ASR	-0.4	-0.5	1.1	-0.5	
Total	n	63	117	147	117	444

The relationship between *Outcome* and *Hitting type* (X^2=43.147, p<0.05), which presented moderate strength of association (φc=0.312), is detailed in Table V.

Table V. Relationship between the variables *Outcome* and *Hitting type*.

		Outcome				
Hitting type		Goal	On goal	Out	Other	Total
Foot inside	n	27	27	24	26	104
	EF	14.8	27.4	34.4	27.4	104.0
	ASR	**3.9***	-0.1	**-2.5***	-0.4	
Foot instep	n	19	60	77	67	223
	EF	31.6	58.8	73.8	58.8	223.0
	ASR	**-3.4***	0.3	0.6	1.8	
Foot toe	n	8	20	27	18	73
	EF	10.4	19.2	24.2	19.2	73.0
	ASR	-0.9	0.2	0.8	-0.4	
Foot outside	n	2	3	4	2	12
	EF	1.7	3.2	4.0	3.2	12.0
	ASR	0.2	-0.1	0.0	-0.1	
Foot heel	n	3	1	0	0	4
	EF	0.6	1.1	1.3	1.1	4.0
	ASR	**3.5***	-0.1	-1.4	-1.2	
Head frontal	n	3	3	8	2	16
	EF	2.3	4.2	5.3	4.2	16.00
	ASR	0.5	-0.7	1.5	-1.3	
Head lateral	n	0	0	1	1	2
	EF	0.3	0.5	0.7	0.5	2.0
	ASR	-0.6	-0.8	0.5	0.8	
Total	n	63	117	147	117	444

The results revealed that shots made with the inside of the foot had higher probability than expected of ending in a goal (*ASR*=3.9, *n*=27, *EF*=14.8) and lower probability than expected of going out of the goal (*ASR*=-2.5, *n*=24, *EF*=34.4). By contrast, the probability that shots made with the foot instep ended in a goal was lower than expected (*ASR*=-3.4, *n*=19, *EF*=31.6).

Furthermore, the probability that shots made with the foot heel ended in a goal was higher than expected (*ASR*=3.5, *n*=3, *EF*=0.6). However, this result should not be considered relevant, since only four shots of this kind were recorded.

Table VI details the characteristics of the relationship between the variables *Outcome* and *Shooting height* (X^2=61.181, p<0.05), which yielded moderate strength of association (φc=0.374).

Table VI. Relationship between the variables *Outcome* and *Shooting height*.

		Outcome				
Shooting height		Goal	On goal	Out	Other	Total
Low	n	35	56	44	74	209
	EF	29.7	55.1	69.2	55.1	209.0
	ASR	1.5	0.2	**-5.1***	**4.1***	
Medium	n	16	26	25	31	98
	EF	13.9	25.8	32.4	25.8	98.00
	ASR	0.7	0.0	-1.8	1.3	
High	n	12	35	78	12	137
	EF	19.4	36.1	45.4	36.1	137.0
	ASR	**-2.2***	-0.3	**7.1***	**-5.6***	
Total	n	63	117	147	117	444

The probability that low shots ended out of the goal was lower than expected (*ASR*=-5.1, *n*=44, *EF*=69.2), while the probability that other outcomes occurred was higher than expected (*ASR*=4.1, *n*=74, *EF*=55.1). On the other hand, there was lower probability than expected that high shots ended in a goal (*ASR*=-2.2, *n*=12, *EF*=19.4) or in other outcomes (*ASR*=-5.6, *n*=12, *EF*=36.1), while the probability of the ball going out of the goal in high shots was higher than expected (*ASR*=7.1, *n*=78, *EF*=45.4).

The information regarding the moderate association (φc=0.430) between *Outcome* and *Opposition* (X^2=82.090, p<0.05) is shown in Table VII.

Table VII. Relationship between the variables *Outcome* and *Opposition*.

		Outcome				
Opposition		Goal	On goal	Out	Other	Total
No opposition	n	9	0	2	0	11
	EF	1.6	2.9	3.6	2.9	11.0
	ASR	**6.5***	**-2.0***	-1.1	**-2.0***	
Goalkeeper	n	23	31	29	4	87
	EF	12.3	22.9	28.8	22.9	87.0
	ASR	**3.7***	**2.2***	0.0	**-5.1***	
Far opposition	n	13	36	46	48	143
	EF	20.3	37.7	47.3	37.7	143.0
	ASR	**-2.1***	-04	-0.3	**2.4***	
Close opposition	n	18	50	70	65	203
	EF	28.8	53.5	67.2	53.5	203.0
	ASR	**-2.9***	-0.8	0.6	**2.5***	
Total	n	63	117	147	117	444

In the analysed matches, there was higher probability than expected of scoring a goal when shooting with no opposition *(ASR=6.5, n=9, EF=1.6)* or alone in front of the goalkeeper *(ASR=3.7, n=23, EF=12.3)*. In the latter case, the probability of shooting on goal was also higher than expected *(ASR=2.2, n=31, EF=22.9)*, while the probability of achieving other outcomes was lower than expected *(ASR=-5.1, n=4, EF=22.9)*. When shots with opposition, either far or close, were performed, the probability of scoring a goal was lower than expected *(ASR=-2.1, n=13, EF=20.3* and *ASR=-2.9, n=18, EF=28.8, respectively),* while the probability of obtaining other outcomes was higher than expected *(ASR=2.4, n=48, EF=37.7* and *ASR=2.5, n=65, EF=53.5*, respectively*)*.

Finally, the relationship between *Outcome* and *Playing situation* (X^2=24.662, *p*<0.05), which presented low strength of association (*φc*=0.236), is detailed in Table VIII.

Table VIII. Relationship between the variables *Outcome* and *Playing situation*.

		Outcome				
Playing situation		Goal	On goal	Out	Other	Total
Continuous playing	n	59	111	141	97	408
	EF	57.9	107.5	135.1	107.5	408.0
	ASR	0.6	1.4	**2.2***	**-4.1***	
Penalty kick	n	1	0	0	0	1
	EF	0.1	0.3	0.3	0.3	1.0
	ASR	**2.5***	-0.6	-0.7	-0.6	
Free kick	n	3	6	6	20	35
	EF	5.0	9.2	11.6	9.2	35.0
	ASR	-1.0	-1.3	**-2.1***	**4.3***	
Total	n	63	117	147	117	444

The results revealed that when a shot was made during continuous playing, there was higher probability than expected that the ball went out of the goal (*ASR*=2.2*, n*=141*, EF*=135.1) and lower than expected that other outcomes occurred (*ASR*=-4.1*, n*=97*, EF*=107.5). By contrast, the probability of scoring a goal with a penalty kick was higher than expected (*ASR*=2.5*, n*=1*, EF*=0.1). Nonetheless, this result is not very relevant, since only one penalty kick was recorded in all the analysed matches. Lastly, there was lower probability than expected that the ball went out of the goal after a free kick (*ASR*=-2.1*, n*=6*, EF*=11.6) and higher than expected of obtaining other outcomes (*ASR*=4.3*, n*=20*, EF*=9.2).

DISCUSSION

From a descriptive point of view, two of the three teams who performed a highest number of shots per match were the ones who reached highest ranks in the competition: Russia (first), Ukraine (second) and Iran (third). These results reveal that players with cerebral palsy behave in a way similar to able-bodied football players, i.e., the teams who make a higher number of shots are the

ones who achieve the best results in competition (Casáis et al., 2011; Szwarc, 2004).

Another relevant aspect is that players with best functional capacity (CP8) performed almost the same number of shots as CP7 players, despite the fact that only one player classified as CP8, but up to four CP7 players, may be on the field at a time. This is in line with what happens in other sport modalities for the disabled, such as wheelchair basketball (Molik et al., 2009), and confirms that team playing efficiency in sports for the disabled is very much affected by the athletes' functional class. This justifies the existence of functional classification systems in order to ensure competition equity. Nevertheless, it is noteworthy that the probability that players with best functional capacity (CP8) scored a goal was not higher than expected despite, as mentioned above, shooting a higher number of times. This means that success in CPF is not determined by the individual actions of the players with best functional capacity. Therefore, coaches must make an effort to improve tactical aspects to facilitate goal scoring, as in the rest of team sports.

In regard to time, the results showed that most shots were performed towards the end of the match. This may be due to fatigue, which makes teams more disorganised and the game faster, with more frequent transitions from one side of the field to the other (Tsitskaris et al., 2002). Regarding player position, forwards were the ones who achieved highest shooting percentage per match. Teams usually play with two defenders, three midfielders and one forward (up to two). Differences in shooting percentage per match based on player position were also found in goalball, a team sport for the visually impaired (Morato et al., 2017).

The results also revealed that the field zone may affect shooting performance in CPF. When shots were performed from zones 2, 3 or 6 of the field, the probability of scoring a goal was higher than expected. This may be because these are central field areas. By contrast, when shots came from zone 1, on the corner next to the goal line, the probability that the ball went out of the goal was higher than expected. Furthermore, when shots were made from zones 9 or 14, there was higher probability than expected that other outcomes occurred. These zones are far from the goal, so it is likely that another player (defender or forward) will stand in the shooting trajectory. From zone 14, there was lower probability than expected of scoring a goal or shooting out of the goal, because this is also a central field area. The results are in keeping with previous studies concerning other sports, such as floorball (Prieto et al., 2013) or basketball (Ibáñez et al., 2009). These authors reported that shots performed from areas closer to the target (goal or basket) had higher success rate.

The characteristics of the CPF sport context determine the effectiveness of the final action, as it occurs in other team sports, such as field hockey (Piñero, 2008) or floorball (Prieto et al., 2013), where the shot is affected by previous technical actions, such as the pass. The probability of scoring a goal was higher when the inside of the foot was used to shoot. This type of hit is used close to the goal to better adjust the ball direction. Nevertheless, when shooting with the foot instep, the probability of scoring a goal was lower than expected, since this

type of hit is used in far, powerful, but less controlled shots. This is in contrast to the fact that players most often use their instep to shoot, despite this type of hit not yielding higher probability than expected of being successful.

There was also lower probability than expected that low shots went out of the goal, but higher than expected of obtaining other outcomes. This may be because the ball is more often cleared at low height. On the other hand, the probability that high shots ended in a goal or in another outcome was lower than expected, due to the higher probability than expected that they went out. This is in line with what happens in other sport modalities for the disabled, such as goalball, in which shot effectiveness depends on their height (Morato et al., 2017).

In CPF, when a player shot with no opposition or only with the goalkeeper's opposition, the probability that the outcome was a goal was higher than expected. In the latter case, the probability of shooting on goal was also higher than expected. This makes sense, since the shots were made with no defensive pressure, what confirms that the study reflects the real game. However, when the shots were made against far or close opposition, there was lower probability than expected that they ended in a goal, but higher than expected that other outcomes occurred. It is usual in CPF that players stand in the ball's trajectory to the goal and, especially at the moment of shooting, that players in the defence try to intercept the shot, as it happens in basketball (Ibáñez et al., 2009), where the effectiveness increases significantly with low or no defensive pressure.

Finally, when a shot was performed during continuous playing, there was higher probability than expected that the ball went out of the goal. This is in contrast to what happened after a free kick, when the probability of the ball going out was lower than expected and of producing another outcome was higher than expected. This seems to be due to the fact that most free kicks impact on the players that are standing in the wall.

CONCLUSION

A high number of shots are performed in elite CPF, especially in the last minutes of the match, the highest-ranked teams being the ones who made the highest number of shots per match. Central field areas were the most frequently used to shoot, with a balance between shots on goal and out of the goal. Likewise, forward players with best functional capacity (CP8) performed the highest number of shots, despite not having higher success rate than the rest of players in the team.

The right foot and the instep were the most frequently used hitting areas to shoot, most often at low height and against close opposition. Nevertheless, only the shots made with the inside of the foot had higher probability than expected of ending in a goal.

To sum up, it may be concluded that the shot with highest success rate should be performed from zones 2, 3 or 6 of the field, with the inside of the foot, at low height and with no opposition or only with the goalkeeper's opposition.

LIMITATIONS

The main limitation of the present study was the scarcity of scientific literature, in contrast with the large amount of papers found regarding football for able-bodied athletes.

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