Journal of Physical Education and Sport ® (JPES), Vol. 21 (issue 6), Art 472, pp. 3483 - 3495, December 2021
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Influence of the functional class of the players in wheelchair basketball: a comparative match analysis

ROBERTO ALSASUA[1], RUBÉN ARROYO[2], JAVIER ARANA[3], DANIEL LAPRESA[4], M. TERESA ANGUERA[5]
[1,3,4]Department of Educational Sciences. University of La Rioja, SPAIN.
[2]Department of Education in Sciences. University of Burgos; Department of Physical Education and Sport. Pontifical University of Salamanca. SPAIN.
[6]Faculty of Psychology. University of Barcelona, SPAIN.

Published online: December 30, 2021
(Accepted for publication December 15, 2021)
DOI:10.7752/jpes.2021.06472

Abstract:
With the use of the observational methodology, a comparative match analysis has been carried out between the two finalist teams of the Paralympic Games in Rio de Janeiro 2016 -the observational sampling is made up of all the sequences finished in shooting in each of the matches played by the selections of USA and Spain-. The objective has been to characterize the way in which both teams resolve the issue of the functional class of their players and their influence on the construction of offensive sequences that end in a shot -effective and ineffective-. An adaptation (the introduction of the functional class handicap criterion) was performed on the observation instrument SOBL-2. Regarding the recording and coding process, the observation instrument has been introduced in the software LINCE. The reliability of the data has been guaranteed, in the form of inter-observer agreement, by means of the Cohen's Kappa coefficient. The results of the analysis of the search for associative relationships between categorical variables indicate how both selections solve the question of the functional class of their players in different ways; the Spanish team shows a game pattern that is further away from the results reflected in the scientific literature and the US game can be considered more orthodox. The *T-patterns* detected, using the THEME software (v.6 Edu), have made it possible to characterize sequences, effective and ineffective, common and differential in both teams, taking into account the functional class of the players who participate in the construction of the sequences that achieve a shot.
Key Words*:* adapted sports; Paralympic Games; match analysis; effectiveness; observational methodology.

Introduction

Wheelchair basketball is one of the most popular adapted sports, which has a greater number of federative licenses (Cavedon et al., 2015), and with an intense national and international calendar, being one of the most followed sports of the Paralympic Games (Galea et al., 2018). Its origins date back to the end of World War II, when wheelchair basketball was introduced as a rehabilitation therapy for US soldiers returning from the front with spinal cord injuries (Barbero, 2002), becoming a Paralympic sport in the Rome Olympic Games of 1960 (Weissland et al., 2015). The wheelchair basketball rules are similar to those of the running modality: the court has the same measurements, the baskets are at the same height and the scoring system is identical. The difference is that players can only push their chair twice without dribbling or passing the ball (IWBF, 2017). In the wheelchair basketball the teams also consist of 12 players, with a maximum of five players on the court. Each athlete is assigned a score or class -1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0 and 4.5- according to their functional capacity to perform the actions inherent to the game -move the chair, pivot, shoot to the basket, dribble, etc.-; from class 1.0 of the player who does not have any active trunk movement or very poor movements in all planes, to class 4.5 in which the player does not have any manifest weakness in any direction (IWBF, 2014). During the game, the sum corresponding to the functional class of the five players on the court cannot exceed 14 points (IWBF, 2017).
Wheelchair basketball has been the object of study from different areas such as physiology (Antonelli et al.; 2020; Barboza et al., 2019; Conners et al., 2020; Galea et al., 2018; Marzsalek et al. 2019; Molik et al., 2010; Peters, Rice & Bull; 2020), biomechanics (de Witte et al., 2016; Marjolaine et al., 2018; Sasadai et al., 2020; Zacharakis, 2020), or psychology (Kokaridas et al., 2009; Skordilis & Stvrou, 2005).

Match analysis have also been performed (Francis et al., 2019a, 2019b; Gómez et al., 2014; Maksym et al., 2018; Pérez-Tejero & Pinilla, 2015; Pérez-Tejero et al., 2020; Sasadai et al., 2020). The match analysis that have also incorporated an analysis of the influence of the handicap (De Witte et al., 2016; Molik et al., 2017; Skučas et al.; 2009), coincide in pointing out -also in females (Vanlandewijck et al., 2004)- the existence of similarities in performance between close functional classes and the greater relevance in the game and in the score of the players with less functional limitation. The objective of this work is to carry out a comparative match

Corresponding Author: DANIEL LAPRESA, E-mail: daniel.lapresa@unirioja.es

analysis between the two finalist teams of the Paralympic Games in Rio de Janeiro 2016, taking into account, in addition to the place on the field where the successive technical-tactical actions that constitute the sequences that end in a shot, the functional class of the player who performs each action -a question inherent to wheelchair basketball-. In this way, it is intended to characterize the way in which the two finalist teams of the Paralympic Games in Rio de Janeiro 2016 solve the question of the functional class of their players and their influence on the construction of the offensive sequences that end in a shot -effective and ineffective-.

Material & methods

Within the use of observational methodology (Anguera, 1979) an observational design (Anguera et al., 2011) has been proposed: nomothetic; with intersessional follow-up -the performance of the USA and Spain teams, finalists of the last Paralympics Games of Rio de Janeiro 2016, against all their rivals-; intrasessional follow-up -the behaviors developed in each sequence ended in a shot-; and multidimensional -with proxemics type dimensions, related to the places in the field where the actions take place, and with gestural dimensions, where the different technical-tactical actions developed by the players in the offensive phase of the game are displayed-.

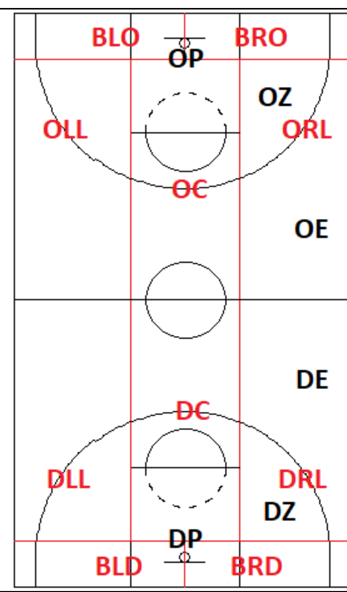
Participants

The observational sampling of this work is made up of all the sequences finished in shooting by the men's teams from USA and Spain in the 2016 Paralympic Games in Rio de Janeiro. The number (fixed) with which the players identified and their functional class from the USA team was: players 12 and 13 (class 1.0), player 42 (class 2.0), players 2, 16 and 20 (class 2.5), player 5 (class 3.0), players 4, 9 and 11 (class 3.5), and players 8 and 15 (class 4.5). For Spain: player 8 (class 1.0), players 4 and 15 (class 1.5), players 11 and 14 (class 2.5), players 5, 7, 9, 10 and 17 (class 3.0), player 13 (class 4.0), and player 15 (class 4.5) (Results Book of the Wheelchair Basketball Competitions, Paralympic Games 2016). The distribution of positions of these players, based on their handicap, is in line with that found in the scientific literature (De Witte et al., 2016; Vanlandewijck et al., 2003; Vanlandewijck et al., 2004). The recordings of all the matches were obtained from the video channel, free to air, of the International Paralympic Committee (https://www.youtube.com/user/ParalympicSportTV). This work has the relevant informed consents and the approval of the Research Ethics Committee of the University of xxxx (file nº 25238).

An adaptation was performed (Table 1) on the observation instrument that Alsasua et al. (2019) developed from the SOBL-2 prepared by Fernández et al. (2009). Specifically, adaptation refers, in line with the objective of this work, to the introduction of the functional class handicap criterion.

Table 1. Observation instrument: dimensions, categories and codes.

Dimension	Category (codes)
Laterality	Offensive Right Lateral (ORL); Bottom Right Offensive (BRO); Offensive Center (OC); Offensive Left Lateral (OLL); Bottom Left Offensive (BLO); Defensive Right Lateral (DRL); Bottom Right Defensive (BRD); Defensive Center (DC); Defensive Left Lateral (DLL); Bottom Left Defensive (BLD)
Area	Offensive exterior (OE); Offensive zone (OZ); Offensive paint (OP); Defensive exterior (DE); Defensive zone (DZ); Defensive paint (DP); Out of the field (OF)
Game action	Ball recovered (BR); Defensive rebound (DR); Offensive rebound (OR); Penultimate pass (P1); Penultimate reception (R1); Last pass (P2); Last reception (R2); New possession (NP); Shot (SH)
Completion	Favorable: Score (SC), Received foul (RF) and Score and Foul (A1). Unfavorable: Miss (MS), Violation/foul in attack (VI) and Block (BL)
Game start	Ball in Play (BP); Offensive throw-in (OT); Offensive bottom throw-in (OBT); Initial jump (IJ); Defensive bottom throw-in (DFT); Defensive throw-in (DT); Free shot (FS)
Class	Class 1.0 (H10); Class 1.5 (H15); Class 2.0 (H20); Class 2.5 (H25); Class 3.0 (H30); Class 3.5 (H35); Class 4.0 (H40); Class 4.5 (H45)
Player	Player-number 1 (J1) ...



Recording and Coding

Regarding the recording and coding process, the observation instrument has been introduced in the software LINCE (Gabin et al., 2012). In the record of these actions, the place and time where they take place are incorporated; thus, according to the Bakeman (1978) classification, the data used are type IV, concurrent and time-based. Table 2 shows the rivals of the teams observed in each of the matches and the phase to which that match corresponds (group, quarterfinals, semi-final and final), the number of sequences recorded in each match, and the accumulated sequences per team, which will allow us to identify which match corresponds to each occurrence of the T-patterns detected.

Table 2. Observational sampling.

Rival Spain	Sequences	Cumulative sequences Spain	Rival USA	Sequences	Cumulative sequences USA
Canada (Group A)	73	1-73	Brazil (Group B)	70	1-70
Japan (Group A)	62	74-135	Germany (Group B)	69	71-139
Turkey (Group A)	64	136-199	Argelia (Group B)	68	140-207
Australia (Group A)	69	200-268	Iran (Group B)	72	208-279
Netherlands (Group A)	66	269-334	Great Britain (Group B)	58	280-337
Germany (quarterfinal)	67	335-401	Netherlands (quarterfinal)	62	338-399
Great Britain (semi)	58	402-459	Turkey (semi)	59	400-458
USA (final)	53	460-512	Spain (final)	62	459-520

Data reliability

The reliability of the data that support the present work (McKenzie & Van Der Mars, 2015) has been obtained in the form of inter-observer agreement. Two have been the observers who, after carrying out a training process based on Arana et al. (2016), have registered the data that support the present work -the first observer has registered the entire observational sampling; the second, 10% of the sequences corresponding to each game that constitutes the observational sampling-.

Taking into account the classical reference values of Landis and Koch (1977, p. 165), the results corresponding to Cohen's Kappa (1960) that reflect the concordance of the records corresponding to each match obtain an *almost-perfect* consideration of the agreement: Brazil-USA, 0.889; USA-Germany, 0.888; USA-Iran, 0.910; Algeria-USA, 0.891; USA-Great Britain, 0.883; USA-Netherlands, 0.877; Turkey-USA, 0.913; Spain-USA, 0.936; Spain-Canada, 0.918; Japan-Spain, 0.918; Spain-Turkey, 0.815; Spain-Australia, 0.858; Netherlands-Spain, 0.899; Spain-Germany, 0.941; Spain-Great Britain, 0.884; Spain-USA, 0.892.

Data analysis

Search for associative relationship between categorical variables

This analysis has been carried out by grouped class, understood as the grouping shared by classes 1.0 and 1.5 (grouped class 1), 2.0 and 2.5 (grouped class 2), etc. The first step in the analysis involves determining whether or not there is an association between the following variables: “grouped class” and “team”; “zone” and “team” depending on the “grouped class”; “side” and “team” depending on the “grouped class”; “consequence” and “team” depending on the “grouped class”. For this purpose, Cramer's V coefficient is used which, in addition to analyzing the existence of an association between two categorical variables, makes it possible to measure the intensity of this relationship. Furthermore, it makes it possible to compare the intensity of the relationship between contingency tables that have a different number of rows or columns, as well as a different sample size. Cramer's V reaches a maximum value of 1 in the case of maximum association or perfect association and a minimum value of 0 in a situation of perfect independence (Crewson, 2006).

But experience shows that, with Cramer's V, it is rare to find high intensity values close to 1; in fact, a value of 0.60 is seldom reached. In empirical terms and taking the value of V itself, we can consider 0.60 as a usual maximum value, so a value of 0.30 should be interpreted as an intermediate empirical value (López-Roldán & Fachelli, 2015; Suárez et al, 2019). According to Crewson (2006) in this work an intensity will be considered: high, when the value of the coefficient is greater than 0.50; moderate, if the value is between values lower than 0.50 and 0.30; low, if the value is between values lower than 0.30 and 0.10; and without association, with values lower than 0.10.

Once the significant association between two categorical variables (dimensions) and their intensity has been established, the next step focuses on analyzing the nature of the relationship in more detail; that is, how the categories of the dimensions are related. For this local analysis, the corrected residue analysis is used (Haberman, 1973). The residual analysis consists of dividing the residual in each cell (difference between the observed and expected frequencies) by the square root of the variance of the residual.

The values obtained with this transformation follow an approximately normal distribution. Therefore, for a significance level of 0.05 all those standardized residuals greater than +1.96 are statistically significant -a positive relationship is inferred between the categories of the criteria and they report cells with more cases than there should be in that cell if the variables analyzed were independent-. From residuals less than –1.96 a negative relationship between categories is inferred, indicating that fewer cases have been registered in the box than there should be under the independence hypothesis. For a significance level of 0.01, statistically significant residuals will correspond to values greater than +2.58 or less than -2.58. Take into account that, in the case of a two-dimensional contingency table and one of them with two categories arranged in two columns -as in this study with the Team criterion (USA/Spain)- the residuals are opposed; that is, the sum of both equals zero. Therefore, in order to avoid being redundant in the results section, only the residuals with a positive sign will be mentioned.
T-pattern detection

To specify the statistical results, obtained according to the previous section, in the form of sequence-types, the detection of T-patterns has been performed using the THEME software (v.6 Edu) (Magnusson, 1996, 2000, 2020), that allows detecting regular patterns of behavior hidden in the record. Although the main contribution of THEME is the detection of temporal patterns, the software also offers the possibility of detecting sequential structures under the order parameter -from a constant duration assignment to each unit of behavior-, which provides some very relevant possibilities for the analysis of sequentiality since it allows us to deduce if the behaviors are consecutive or if there are gaps in the T-pattern -interspersed behaviors- between the detected multievents (Lapresa, Arana et al., 2013; Lapresa, Anguera et al., 2013).

The search parameters listed below have been selected (see reference manual: PatternVision Ltd and Noldus Information Technology bv, 2004): a) the type of T-patterns fast was used, so that the lower time limit of the critical interval is set at a value equal to 0 -with which the components of the critical interval tend to occur relatively quickly in succession-; b) a minimum number of occurrences equal to or greater than 5 has been set; c) significance level of 0.005 -that is, the percentage of accepting a critical interval due to chance is 0.5%-.
Once the search for the selection of T-patterns has been applied, using qualitative filters (Amatria et al., 2017), we selected the T-patterns that: a) incorporate the multi-event “completion” -corresponding to the shot-; b) the multievents reflected in T-pattern correspond to consecutive behaviors.

Results

In the first place, the search results of the associative relationship between categorical variables are presented and, later, the T-patterns detected with the search parameters set forth that have allowed characterizing effective and ineffective type sequences in the selections from the USA and Spain.

Search results for associative relationship between categorical variables

It is confirmed that there is a significant association, although of low intensity, between the criteria “grouped-class” (class 1, 2, 3 and 4) and “team” (Cramer's V=0.129; p=0.001). The local analysis shows a great positive relationship between the USA and that the shot to the basket is made by a player of grouped class 2 (residual=3.5). On the contrary, there is a positive relationship in which a player of grouped class 4 is the one who makes the shot to the basket for the Spanish team (residual=3.0).
If we incorporate in the search procedure the dimension “zone” (“zone” and “team” by “grouped class”) it is found that there is a significant association in all the grouped classes -except for the grouped class 1-: in the grouped classes 3 and 4 this association is moderate -being higher in grouped class 3 (Cramer's V=0.375; p<0.01) than in clustered class 4 (Cramer's V=0.325; p<0.01)-, and in grouped class 2 is low (Cramer's V=0.222; p=0.001). If we incorporate the dimension “side” (“side” and “team” by “grouped class”) in the search procedure for associative relationships between categorical variables, there is also a significant association in all grouped classes, except for grouped class 1.

Regarding intensity, we can confirm that in grouped class 4 it is moderate (Cramer's V=0.377; p<0.01), and low in grouped classes 2 and 3 (Cramer's V=0.185; p=0.036) (Cramer's V=0.289; p<0.01). The results of the adjusted residual analysis between categories of these dimensions are presented graphically in detail in Figure 1.

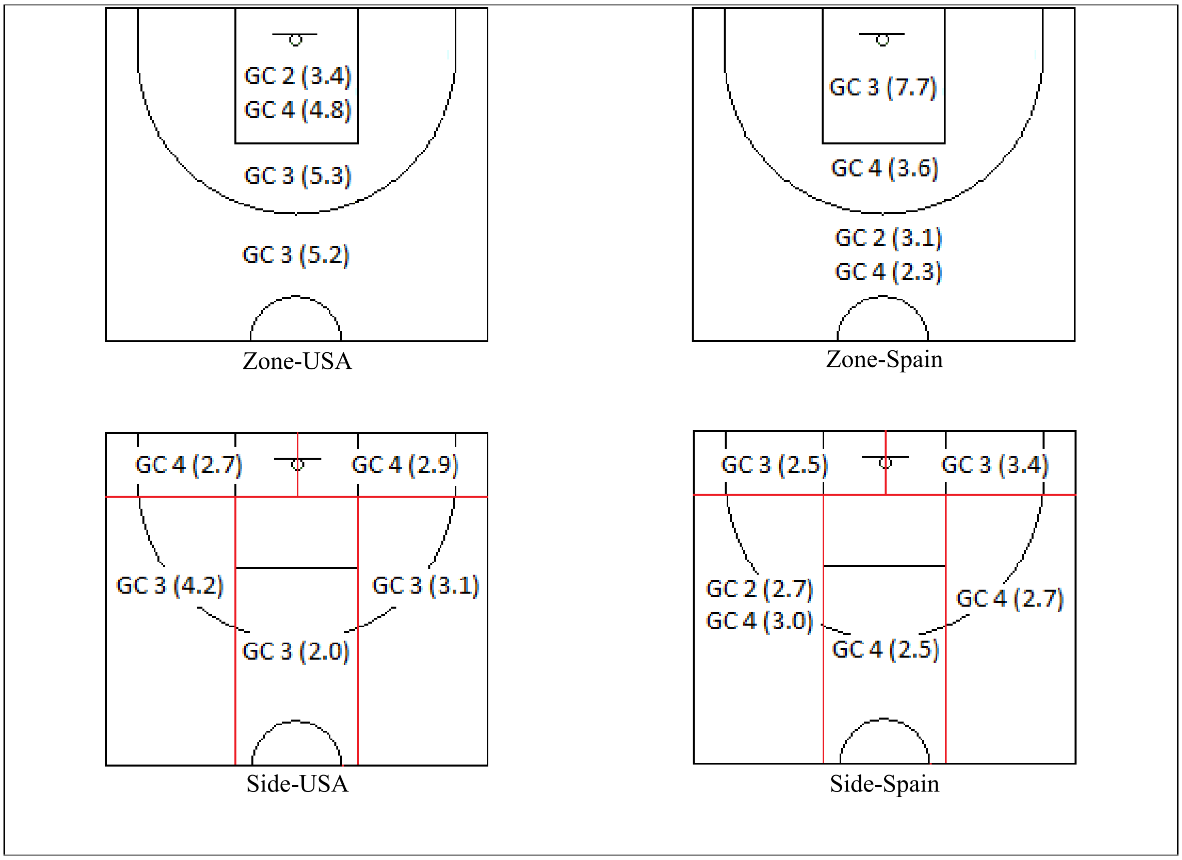


Figure 1: Adjusted residuals (in parentheses) relative to the use of the zone and the side by team and grouped class (GC).

Regarding the search for an associative relationship between the categorical variables "consequence" and "team" by "grouped class", a significant association has been detected in all classes, except for the grouped class 3. Regarding intensity, we can confirm that in grouped class 1 this relationship is moderate (Cramer's V=0.429; p<0.11), and low in grouped classes 2 and 4 (Cramer's V=0.185; p=0.013) (Cramer's V=0.249; p<0.01). In the adjusted residuals analysis, it is found that there is a positive relationship in the players of grouped class 1, between shot and favorable consequence (residual=2.5), if the shot is executed by a player from Spain compared to a player from the USA. In the case of grouped class 2 players, the situation is the other way around, there is a positive relationship between shot and favorable consequence (residual=2.5), if the shot is executed by a USA player compared to a spanish player. Finally, in relation to the players of grouped class 4, it is found that there is a positive relationship (residual=3.7) between shot and favorable consequence. This is found if it is executed by a player from the USA compared to if it is performed by a player from Spain.

T-patterns detected

Tables 3 and 4 show the T-patterns detected according to the previously exposed search parameters that incorporate the completion multievent -the one that incorporates the shot-. Table 3 shows those effective sequences -that end with a scored shot-, while Table 4 shows the ineffective sequences -those with a failed shot-. For a better understanding of the information contained in the multievents of the T-patterns detected, effective (figure 2) and ineffective (figure 3) type sequences have been characterized.

Table 3. T-patterns detected reflecting effective sequences; the number of occurrences, the sequences in which it takes place, the area and side from where the shot is made and the functional class of the player who executes it are included.

Team	T-pattern	Occu.	Sequences	Completion	Class
Spain	(BLO,OP,R2,H30 BLO,OP,SH,SC,H30)	32	4-6-10-31-37-40-48-50-127-137-157-163-167-189-197-252-253-261-274-279-353-378-389-393-409-457-459-463-465-473-483-501	Bottom Left-Paint	3.0
Spain	(BRO,OP,R2,H30 BRO,OP,SH,SC,H30)	11	11-114-121-136-162-196-227-232-238-273-276-306-329-340-348-352-359-367-380-405-407-434-441-442-453-460-485-486	Bottom Right-Paint	3.0
Spain	(BP,BRO,OP,OR,H30 BRO,OP,SH,SC,H30)	10	19-34-84-140-153-166-251-295-339-429	Bottom Right-Paint	3.0

Spain	((OC,OP,P2,H40 BLO,OP,R2,H30) BLO,OP,SH,SC,H30)	7	40-137-157-189-197-252-459	Bottom Left-Paint	3.0
Spain	(OC,OP,R2,H30 BRO,OP,SH,SC,H30)	6	47-173-184-222-296-369	Bottom Right-Paint	3.0
Spain	(OC,OP,R2,H30 BLO,OP,SH,SC,H30)	6	49-172-191-395-456-502	Bottom Left-Paint	3.0
Spain	((OLL,OZ,P2,H40 BRO,OP,R2,H30) BRO,OP,SH,SC,H30)	5	227-276-352-434-441	Bottom Right-Paint	3.0
Spain	(BP,BLO,OP,OR,H30 BLO,OP,SH,SC,H30)	5	23-111-202-341-362	Bottom Left-Paint	3.0
Spain	(BRO,OP,R2,H25 BRO,OP,SH,SC,H25)	5	54-194-208-476-481	Bottom Right-Paint	2.5
Spain	(BRO,OZ,R2,H30 BRO,OZ,SH,SC,H30)	5	333-379-425-492-495	Bottom Right-Zone	3.0
Spain	(BLO,OP,R2,H25 BLO,OP,SH,SC,H25)	5	64-99-116-220-272	Bottom Left-Paint	2.5
Spain	(BLO,OP,R2,H30 BLO,OP,SH,A1,H30)	5	265-283-292-488-497	Bottom Left-Paint	3.0
USA	(BRO,OP,R2,H35 BRO,OP,SH,SC,H35)	10	56-97-100-181-210-246-358-380-419-435	Bottom Right-Paint	3.5
USA	(BRO,OP,R2,H45 BRO,OP,SH,SC,H45)	9	73-124-139-205-267-354-462-490-492	Bottom Right-Paint	4.5
USA	(BRO,OZ,R2,H35 BRO,OZ,SH,SC,H35)	8	57-187-344-346-382-385-408-439	Bottom Right-Zone	3.5
USA	(BLO,OP,R2,H25 BLO,OP,SH,SC,H25)	5	209-235-276-321-384	Bottom Left-Paint	2.5

Table 4. T-patterns detected reflecting ineffective sequences; the number of occurrences, the sequences in which it takes place, the area and side from where the shot is made and the functional class of the player who executes it are included.

Team	T-pattern	Occu.	Sequences	Completion	Class
Spain	(BLO,OP,R2,H30 BLO,OP,SH,MS,H30)	20	17-26-42-79-108-110-175-179-187-210-284-343-361-370-373-387-399-423-504	Bottom Left-Paint	3.0
Spain	(BRO,OP,R2,H30 BRO,OP,SH,MS,H30)	12	18-83-89-93-152-156-164-264-294-351-356-426	Bottom Right-Paint	3.0
Spain	(OC,OP,R2,H30 OC,OP,SH,MS,H30)	11	29-130-169-225-236-319-327-360-447-503-508	Center-Paint	3.0
Spain	(OLL,OE,R2,H25 OLL,OE,SH,MS,H25)	8	69-165-195-206-255-349-410-452	Left Lateral-Exterior	2.5
Spain	(OLL,OZ,R2,H30 OLL,OZ,SH,MS,H30)	7	20-41-257-260-402-445-479	Bottom Left-Zone	3.0
Spain	(BRO,OZ,R2,H25 BRO,OZ,SH,MS,H25)	6	25-81-464-474-475-507	Bottom Right-Zone	2.5
Spain	(ORL,OE,R2,H40 ORL,OE,SH,MS,H40)	6	192-204-249-281-335-363	Right Lateral-Exterior	4.0
Spain	(OC,OE,R2,H25 OC,OE,SH,MS,H25)	6	32-74-199-416-471-512	Center-Exterior	2.5
Spain	(OC,OZ,R2,H25 OC,OZ,SH,MS,H25)	5	77-155-213-316-320	Center-Zone	2.5
Spain	(BRO,OP,R2,H25 BRO,OP,SH,MS,H25)	5	118-122-124-125-324	Bottom Right-Paint	2.5
Spain	(ORL,OE,R2,H25 ORL,OE,SH,MS,H25)	5	15-113-198-256-271	Right Lateral-Exterior	2.5
Spain	(ORL,OZ,R2,H25 ORL,OZ,SH,MS,H25)	5	8-101-209-215-355	Right Lateral-Zone	2.5
USA	(BLO,OZ,R2,H35 BLO,OZ,SH,MS,H35)	10	79-186-294-296-360-367-420-425-499-502	Bottom Left-Zone	3.5
USA	(BLO,OP,R2,H45 BLO,OP,SH,MS,H45)	9	6-17-68-203-274-336-347-489-520	Bottom Left-Paint	4.5
USA	(OLL,OZ,R2,H35 OLL,OZ,SH,MS,H35)	9	50-70-82-83-135-199-293-313-362	Left Lateral-Zone	3.5
USA	(OC,OE,R2,H35 OC,OE,SH,MS,H35)	7	41-46-175-192-218-249-320	Center-Exterior	3.5
USA	(ORL,OE,R2,H25 ORL,OE,SH,MS,H25)	6	116-170-233-323-392-506	Right Lateral-Exterior	2.5
USA	(OC,OP,R2,H45 OC,OP,SH,MS,H45)	5	137-315-345-507-510	Center-Paint	4.5
USA	(BRO,OZ,R2,H25 BRO,OZ,SH,MS,H25)	5	30-33-166-169-495	Bottom Right-Zone	2.5
USA	(ORL,OZ,R2,H35 ORL,OZ,SH,MS,H35)	5	14-16-177-178-339	Right Lateral-Zone	3.5

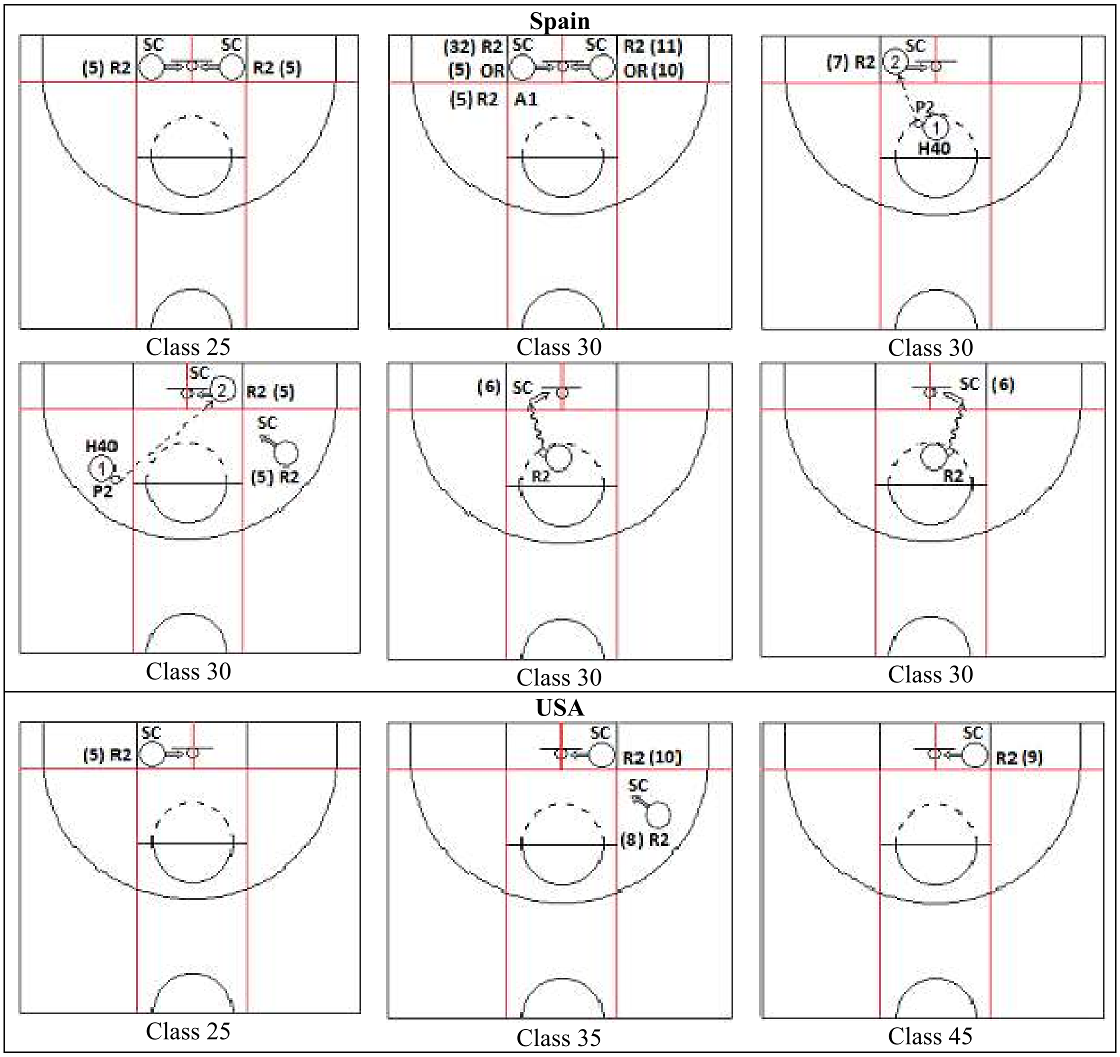


Figure 2. Graphic representation of the typified effective sequences in Spain and the USA by class of the player who performs the shot; in parentheses the number of occurrences of the sequence

Dicussion

First, a search for an associative relationship between dimensions (Cramer's V from the contingency table) and categorical variables (from the adjusted residuals corresponding to each cell) was carried out; subsequently, T-patterns were detected using the THEME software, which has made it possible to characterize effective and ineffective standard sequences in two of the teams that constitute the world elite of wheelchair basketball.

The significant differences detected indicate that in the USA more shots are made by grouped class 2 players compared to Spain; while, in Spain, by players of grouped class 4, with respect to the USA. Grashchenkova et al. (2018), based on Official statistics protocols of the Men's World Championship games organized by International Wheelchair Basketball Federation, named grouped class 4 players as "team scorers" since they found that they were the ones who made the most shots and those who got the most points; however, their results also determined that grouped class 2 players are not as influential players due to their shots, their role being more focused on the development of the game. Also Pérez Tejero & Pinilla (2015), Skučas et al. (2009) and Vanlandewijck et al. (2004) determined that the players of grouped class 4, those with the least functional limitation, are the players who make the most shots and obtain greater success rates.

If, in addition, the shooting zone is considered, it has been detected that the USA stands out, compared to Spain, for the shots from the intermediate zone and three points by players of grouped class 3; this result is in line with those obtained by Grashchenkova et al. (2018) who related the players of this grouped class with shots from a medium and long distance, and with the results of Skučas et al. (2009) who characterized the grouped class 3 players as those with the greatest use of the three-point shot. Continuing with the game of the USA, in comparison with Spain, the employment of players of grouped class 2 and 4 stands out for shots from the paint;

the results of Grashchenkova et al. (2018) reflected that the grouped class 4 players were widely and effectively used to take shots from the paint.

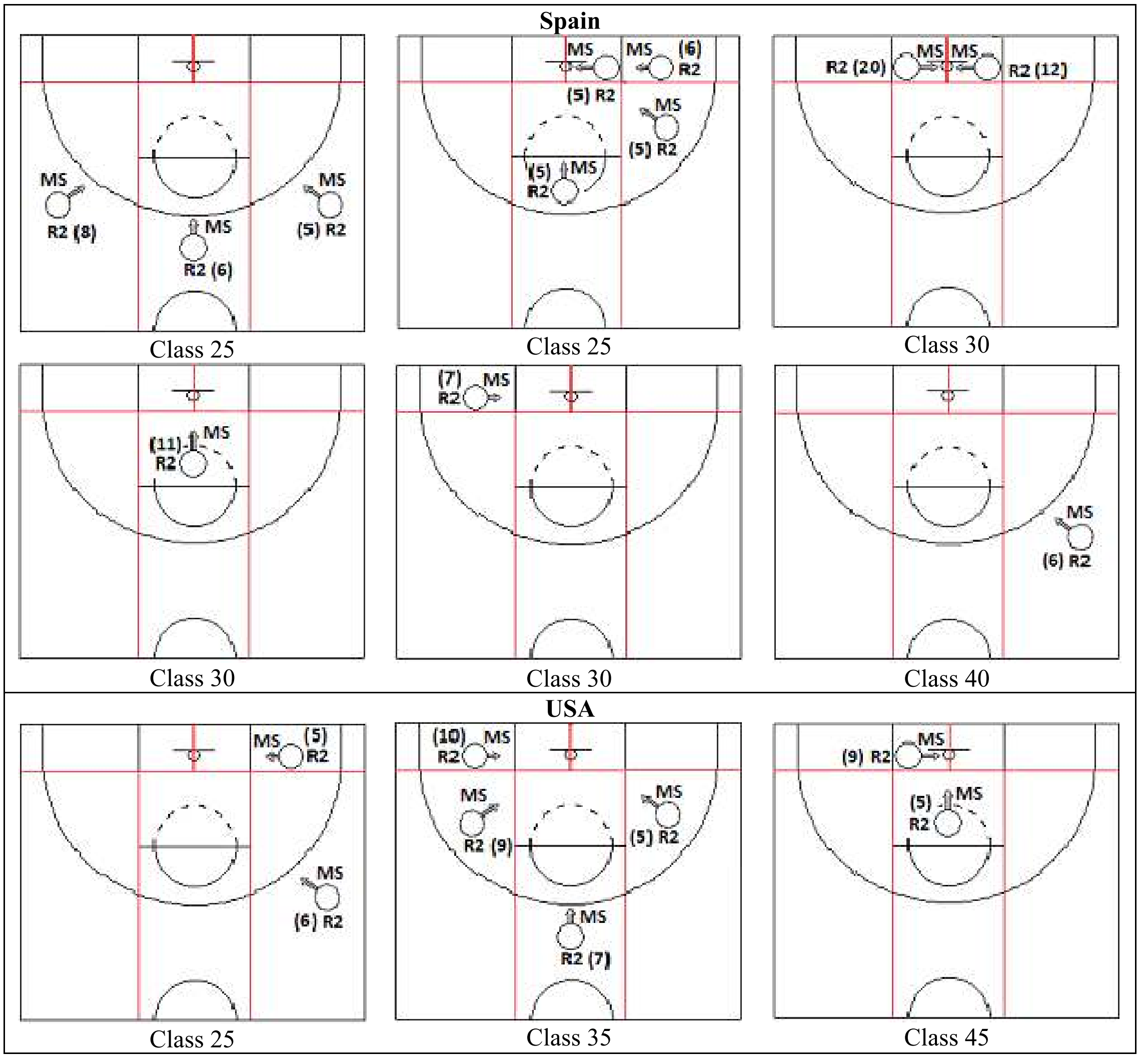


Figure 3. Graphic representation of the ineffective sequences typified in Spain and the USA by class of the player who performs the shot; in parentheses the number of occurrences of the sequence

However, Spain shows a different style of play than the USA -and which is far from the results of Grashchenkova et al. (2018)-, in which grouped class 3 stands out for its shots from the paint, grouped class 4 stands out for its shots from the intermediate zone and, to a lesser extent, from the exterior zone; and the player of grouped class 2 for his shots from the outer zone. In this way, the USA takes advantage of a player of grouped class 4 -the player with the least limitations-, to finish from the paint -the most effective area in both running basketball (Alsasua et al., 2019; Gómez et al., 2013; Serna et al., 2017) and in wheelchair basketball (Vanlandewijck et al., 2004)-; while Spain uses it to finish: from the intermediate zone -which is a rare and probably ineffective area in running basketball (Alsasua et al., 2019; Fernández et al., 2009; Gómez et al., 2013) and in wheelchair basketball, although with greater use in running basketball (Vanlandewijck et al., 2004)-; and also to finish with a three-score shot. Skučas et al. (2009) also characterized this action as common in the player of this grouped class, although it obtained less frequency than the player of the grouped class 3.

If we take into consideration the side from which the shot is made in the proxemic analysis -see observation instrument in table 1- in the USA team, compared to Spain, the following stands out: the realization of shots by players of grouped class 3 from the right side, the left side and to a lesser extent from the center; and the shots by players of grouped class 4 from the right and left bottoms. However, the Spanish team stands out, compared to the USA, for the shots made by: players of grouped class 3 from the right and left bottom; by grouped class 2 players from the left side; and by shots of grouped class 4 players from the right, left and center sides. In the comparison, once again, the greater use of the USA of a player of grouped class 4 in the bottoms stands out -the place of greatest efficiency in terms of shooting in running basketball-; while the center, the place that stands out for the shot by a player of grouped class 3 from Spain, is the least effective place for the shot in running basketball (Alsasua et al. 2019; Fernández et al., 2009; García et al. al., 2013).

Regarding the comparison between teams in relation to the effectiveness obtained by the shot based on the grouped class of the player who performs it, in the USA the association between a shot made by a player of grouped class 4 and obtaining a favorable consequence has been determined; in accordance with those studies that present these players, with less functional limitation, as those who shoot more and who, in turn, obtain greater efficiency with their shots (Grashchenkova et al., 2018, Skučas et al., 2009), and therefore a greater relevance in the game (Iturricastillo, 2016; Pérez-Tejero & Pinilla, 2015; Vanlandewijck et al. 2004). In the USA, the association between a shot made by a player of grouped class 2 and a shot with a favorable consequence has also been detected. However, in the Spanish team an association has been found between the player that shoots being of grouped class 1 and achieving a favorable consequence; this fact contrasts with the results obtained by Grashchenkova et al., (2018) as the player in this grouped class is the one who makes the fewest shots and, according to Pérez Tejero & Pinilla (2015), the one who reports the least effectiveness.

From the information contained in the constitutive multievents of the T-patterns that incorporate efficient sequences (see Table 2), efficient type sequences have been characterized (Figure 2). The large number of effective sequences corresponding to shots made by players of class 2.5 and 3.0 (Spain) and 2.5, 3.5 and 4.5 (USA) stands out in shots from the bottoms and the paint. It should be noted that the bottoms and paint correspond to shots close to the basket, the most effective in studies of running basketball (Alsasua et al., 2019; Fernández et al., 2009; Nunes et al., 2015) and wheelchair basketball (Grashchenkova et al., 2018; Skučas et al., 2009; Vanlandewijck et al., 2004). In Spain, the large number of effective sequences corresponding to shots made by class 3.0 players from the left bottom and the paint stands out -two-point score, as well as score and additional shot-. It should be noted that the left bottom and the paint have also been recognized, in running basketball, as the most effective shooting place among the studies that have analyzed this spatial distribution (Alsasua et al. 2018; García et al. 2010). In the USA, the T-patterns detected incorporate a greater number of sequences with shot from the right side by players of class 3.5 and 4.5 -taking advantage of the fact that players of grouped class 4 are very effective in their shots near the basket (Grashchenkova et al., 2018)-.

In Spain, the presence of offensive rebounds by class 3.0 players is highlighted -effective in offensive rebound according to Grashchenkova et al. (2018)-, as well as the subsequent shots from both bottoms by the players who have caught the rebounds; in line with what happens in running basketball (García et al., 2010). Sequences have also been detected in which the class 3.0 player, after receiving a last pass in the center and the paint, dribbles approaching the basket and scoring from the paint and the bottom. According to Grashchenkova et al. (2018) players in grouped class 3 use dribbling regularly and effectively. Also, in the game of Spain, T-patterns have been detected that reflect sequences with a shot from the left and paint by class 3.0 players after receiving a pass made by a class 4.0 player, from the center and the paint. This sequence has been repeatedly detected in running basketball (Alsasua et al., 2018; Serna et al., 2017).

In Spain, it is worth highlighting the participation of the class 4.0 player -according to Grashchenkova et al. (2018) the grouped class with the most assists per game only behind the grouped class 3- to perform the pass to the player who will make the shot. The class 4.0 player performs this last pass from the center -a more effective place for the pass than for the shot (Refoyo et al. 2009)- and from the left side and the intermediate zone that ended in the basket from the bottom right and paint, confirming the notion that it is possible to obtain efficiency in the shot overcoming close spaces between passer and receiver (Fewell et al., 2012; Ortega and Gómez, 2009).

Finally, it is worth noting, both in Spain and the USA, sequences consisting of shots from the right side and the intermediate zone by players of grouped class 3 (class 3.5 in the USA and class 3.0 in Spain), an area of less use due to its relationship with missing the shot -both in wheelchair basketball (Vanlandewijck et al., 2004) and running basketball (Alsasua et al., 2019; Gómez et al., 2013)-.

On the other hand, ineffective type sequences have been characterized (Figure 3) from the constitutive multievents of the T-patterns detected (Table 3). In both teams, sequences finished with missed shots by players from the confluence between the paint and the bottoms have been detected -Spain players of class 3.0, from the paint and both bottoms; USA players of class 4.5 from the paint and the left bottom- despite being the most effective areas for shooting both in running basketball (Alsasua et al., 2019; Fernández et al., 2009; Nunes et al 2015) and in wheelchair basketball (Grashchenkova et al., 2018; Skučas et al., 2009; Vanlandewijck et al., 2004)-. In both teams, T-patterns have also been detected that incorporate finished sequences -in Spain by class 3.0 players and in the USA by class 4.5 players- with a missed shot from the center and the paint -a place also characterized by its effectiveness in running basketball (Refoyo et al., 2009)-.

Sequences that end with missed shots from the intermediate zone have also been detected in both teams: by Spanish players of class 2.5 -shots from the center, the right side and the right bottom- and of class 3.0 -shots from both bottoms-; and by class 2.5 USA players -shots from the right side-. The intermediate zone, although it is used more in wheelchair basketball than in running basketball, is characterized by its relationship with missed shots (Vanlandewijck et al., 2004).

In addition, sequences have been characterized with a missed shot from the outer zone by both teams; in line with previous results obtained in wheelchair basketball (Gómez et al. 2015; Grashchenkova et al., 2018) and also in running basketball (Alsasua et al. 2019; Gómez et al., 2013). In the USA, the missed shot from the outer zone is carried out: by players in class 3.5 -the grouped class 3.0 is the one that makes the most shots from medium and long distance (Grashchenkova et al., 2018)- from the center -whose relationship with ineffective sequences has also been detected in running basketball (Alsasua et al., 2019; Fernández et al., 2009; Nunes et al 2015)-; and class 2.5 players -whose effectiveness according to Grashchenkova et al. (2018) is compromised in long shots to the basket- from the right side. In Spain sequences have also been characterized with missed shots from the outer zone: by class 2.5 players from the left side, the center and the right side; and by players of class 4.0 from the right side -although it is not a frequent shooting place for players of this grouped class (Grashchenkova et al., 2018)-.

Conclusions

In the present work, a comparative match analysis has been carried out, which has made it possible to characterize the way in which the two finalist teams of the Paralympic Games in Rio de Janeiro 2016 construct the offensive sequences that end in shot. The results obtained show how both teams solve the question of the functional class of their players in different ways. From the statistical analysis it can be deduced that, if we focus exclusively on the functional class of the player who ends the sequence by making the shot, the USA uses a player of grouped class 2 to execute the shot more than Spain, while the number of shots made by a player of grouped class 4 is greater in Spain than in the USA. The comparison regarding the shot zone indicates that the USA stands out for the shots made from: the paint by players of grouped class 2 and 4; and from the intermediate zone and three point shots by players of grouped class 3. In the comparison, Spain stands out for shots of: the grouped class 2 from the outer zone; the grouped class 3 from the paint; and grouped class 4 from the intermediate zone and the outer zone. If the “side” dimension is taken into consideration in the comparison, the use by the USA of a player of grouped class 4 for shots from the bottoms and, by Spain, of a player of grouped class 3 stands out. Regarding the efficiency obtained by the shot based on the grouped class of the player who performs it in the USA, the association between a shot made by players of grouped class 2 and 4 has been found; while in Spain the association detected is one of efficacy due to shots made by players of grouped class 1. Thus, the results of the search analysis of the associative relationship between categorical variables indicate that the Spanish team shows a different game pattern than the USA, further away from the results obtained in the theoretical framework and in the research work carried out to date. However, the USA game can be considered more orthodox.

Regarding the facet of reality shown by the T-patterns detected, both teams have in common effective sequences ended with shots from the right side and the intermediate zone by players of grouped class 3. In Spain, the large number of effective sequences corresponding to shots taken by class 3.0 players from the left bottom and the paint stands out, after rebounding -from both bottoms-, and from the left and the paint after receiving a pass from a class 4.0 player made from the center and paint. USA is characterized by developing effective sequences with shot from the right side by players of class 3.5 and 4.5. Regarding the ineffective sequences, both teams are characterized by constructing finished sequences with missed shots from: the confluence between the paint and the bottoms -in Spain by class 3.0 players and in the USA by class 4.5 players-; from the intermediate zone -Spanish players of class 2.5 and class 3.0; and USA players of class 2.5-; and from the outer zone -players from Spain of class 2.5 and 4.0; and USA class 3.5 and class 2.5 players-.

Conflicts of interest - None.

Acknowledgments

The authors gratefully acknowledge the support of a Spanish government subproject *Integration ways between qualitative and quantitative data, multiple case development, and synthesis review as main axis for an innovative future in physical activity and sports research* [PGC2018-098742-B-C31] (2019-2021) (Ministerio de Ciencia, Innovación y Universidades / Agencia Estatal de Investigación / Fondo Europeo de Desarrollo Regional), that is part of the coordinated project *New approach of research in physical activity and sport from mixed methods perspective* (NARPAS_MM) [SPGC201800X098742CV0]. In addition, authors thanks the support of the Generalitat de Catalunya Research Group, *GRUP DE RECERCA I INNOVACIÓ EN DISSENYS (GRID). Tecnología i aplicació multimedia i digital als dissenys observacionals* [Grant number 2017 SGR 1405]. Also, this study was funded by grants from the University of La Rioja.

References:

Alsasua, R., Lapresa, D., Arana, J., & Anguera, M.T. (2019). A log-linear analysis of efficiency in elite basketball applied to observational methodology. *International Journal of Sports Science & Coaching*, *14* (3), 363-371. https://doi.org/10.1177/1747954119837819

Alsasua, R., Lapresa, D., Arana, J., Anguera, M.T., & Garzón, B. (2018). Successful and unsuccessful offensive sequences ending in a shot in professional and elite under-16 basketball. *Journal of Human Kinetics, 64* (1), 147-159. https://doi.org/10.1515/hukin-2017-0191

Amatria, M., Lapresa, D., Arana, J., Anguera, M.T., & Jonsson, G.K. (2017). Detection and Selection of Behavioral Patterns Using Theme: A Concrete Example in Grassroots Soccer. *Sports*, *5*(1), 20; https://doi.org/10.3390/sports5010020

Anguera, M.T. (1979). Observational Typology. Quality & Quantity. *European-American Journal of Methodology*, *13*(6), 449-484.

Anguera, M.T., Blanco-Villaseñor, A., Hernández-Mendo, A., & Losada, J.L. (2011). Diseños observacionales: ajuste y aplicación en psicología del deporte [Observational Designs: Their Suitability and Application in Sports Psychology]. *Cuadernos de Psicología del Deporte, 11*(2), 63-76.

Antonelli, C., Hartz, C., Silva, S., & Moreno, M.A. (2020). Effects of Inspiratory Muscle Training With Progressive Loading on Respiratory Muscle Function and Sports Performance in High-Performance Wheelchair Basketball Athletes: A Randomized Clinical Trial. *International Journal of Sports Physiology and Performance*, *15* (2), 238-242. https://doi.org/10.1123/ijspp.2018-0979.

Arana, J., Lapresa, D., Anguera, M.T., & Garzón, B. (2016). *Ad hoc* procedure for optimising agreement between observational records. *Anales de Psicología, 32*(2), 589-595. http://dx.doi.org/10.6018/analesps.32.2.213551

Bakeman, R. (1978). Untangling streams of behavior: Sequential analyses of observation data. In G.P. Sackett (Ed.), *Observing behavior. Vol. II: Data collection and analysis methods* (pp. 63-78). Baltimore: University Park Pres

Barbero, J. (2002). Historia del deporte adaptado [History of adapted sport]. *Minusval*, 135, 20-21.

Barboza, B., Emanuel, Oliveira, M., Lambert, E., Werle, E., Marta, S., & Greguol, M. (2019). Does the type of disability influence salivary cortisol concentrations of athletes in official wheelchair basketball games? *International Journal of Sports Science & Coaching, 14*(4) 507–513. https://doi.org/10.1177/1747954119850301

Cavedon, V., Zancanaro, C., & Milanese, C. (2015). Physique and performance of young wheelchair basketball players in relation with classification. *Plos One, 10* (11), 1–20. https://doi.org/10.1371/journal.pone.0143621

Conners, R.T., Elliott, J.M., Kyle, D.L., Solomon, S., & Whitehead, P.N. (2020). Physiological Responses of Youth Players during Wheelchair Basketball Games. *European Journal of Adapted Physical Activity, 13*(2), 1–11. https://doi.org/10.5507/euj.2020.005

Crewson, P. (2006). *Applied statistics handbook*. Leesburg: AcaStat Software.

De Witte, A.M.H., Hoozemans, M.J.M., Berger, M.A.M., Veeger, H.E.J., & van der Woude, L.H.V. (2016). Do field position and playing standard influence athlete performance in wheelchair basketball? *Journal of Sports Sciences, 34*(9), 811-820. https://doi.org/10.1080/02640414.2015.1072641

Fernández, J., Camerino, O., Anguera, M.T., & Jonsson, G.K. (2009). Identifying and analyzing the construction and effectiveness of offensive plays in basketball by using systematic observation. *Behavior Research Methods, 41*(3), 719-730. https://doi.org/10.3758/BRM.41.3.719

Fewell, J.H., Armbruster, D., Ingraham, J., Petersen, A., & Waters, J.S. (2012). Basketball Teams as Strategic Networks. *Plos One, 7*(11), e47445. https://doi.org/10.1371/journal.pone.0047445

Francis, J., Owen, A., & Peters, D.M. (2019). A New Reliable Performance Analysis Template for Quantifying Action Variables in Elite Men's Wheelchair Basketball. *Frontiers in Psychology, 10*(16). https://doi.org/10.3389/fpsyg.2019.00016.

Francis, J., Owen, A., & Peters, D.M. (2019). Making Every "Point" Count: Identifying the Key Determinants of Team Success in Elite Men's Wheelchair Basketball. *Frontiers in Psychology, 10*(1431). https://doi.org/10.3389/fpsyg.2019.01431.

Gabín, B., Camerino, O., Anguera, M. T., & Castañer, M. (2012). Lince: multiplatform sport analysis software. *Procedia-Social and Behavioral Sciences*, 46, 4692– 4694. https://doi.org/10.1016/j.sbspro.2012.06.320

Galea, I., Dulceanu, C., & Ungureanu, O. (2018). Aspects of the relationship between heart rate and precision of throwing in wheelchair basketball. Preliminary study. *Arena-Journal of Physical Activities*, 7, 21-29.

García, J., Ibáñez, S.J., Martínez de Santos, R., Leite, N., & Sampaio, A.J. (2013). Identifying Basketball Performance Indicators in Regular season and Playoff Games. *Journal of Human Kinetics*, 36, 161-168. https://doi.org/10.2478/hukin-2013-0016

Gómez, M.A., Lorenzo, A., Ibáñez. S.J., & Sampaio, J. (2013) Ball possession effectiveness in men's and women's elite basketball according to situational variables in different game periods. *Journal of Sports Sciences, 31*(14), 1578-1587. https://doi.org/10.1080/02640414.2013.792942

Gómez M.A., Molik, B., Morgulec-Adamowicz, N., & Szyman. J.R. (2015). Performance analysis of elite women's wheelchair basketball players according to team-strength, playing-time and players' classification. *International Journal of Performance Analysis in Sport, 15* (1), 268-283, https://doi.org/10.1080/24748668.2015.11868792

Gómez M.A., Pérez, J., Molik, B., Szyman. J. R., & Sampaio, J. (2014). Performance analysis of elite men's and women's wheelchair basketball teams. *Journal of Sports Sciences, 32*(11), 1066-1075, https://doi.org/10.1080/02640414.2013.879334

Grashchenkova, Z., Mishyn, M., Okopnyy, A., Pityn, M., & Hnatchuk, Y. (2018). Peculiar Features of Competitive Activity of Qualified Wheelchair Basketball Players. *Journal of Physical Education and Sport*, *18*(4), 2331-2337. https://doi.org/10.7752/jpes.2018.04352

Haberman, S.J. (1973). The Analysis of Residuals in Cross-Classified Tables. *Biometrics,* 29,205-220.

International Wheelchair Basketball Federation. (2014). *Classification Manual basketball player in a wheelchair*. IWBF. Canada.

International Wheelchair Basketball Federation. (2017). *Official Wheelchair Basketball Rules*. IWBF. Switzerland.

Iturricastillo Urteaga, A., Yanci Irigoyen, J., Barrenetxea Iriondo, I., & Granados Dominguez, C. (2016). Análisis de la intensidad de juego durante los partidos de play-off en jugadores de baloncesto en silla de ruedas [Game intensity analysis of wheelchair basketball players during play-off matches]. *Retos*, (30), 54-58. https://doi.org/10.47197/retos.v0i30.39660

Kokaridas, D., Perkos, S., Harbalis, T., & Koltsidas, E. (2009). Sport orientation and athletic identity of Greek wheelchair basketball players. *Perceptual and Motor Skills, 109*(3), 887-898. https://doi.org/10.2466/pms.109.3.887-898

Lapresa, D., Anguera, M. T., Alsasua, R., Arana, J., & Garzón, B. (2013). Comparative analysis of T-patterns using real time data and simulated data by assignment of conventional durations: the construction of efficacy in children's basketball. *International Journal of Performance Analysis in Sport*, 13(2), 321-339. https://doi.org/10.1080/24748668.2013.11868651

Lapresa, D., Arana, J., Anguera, M.T., & Garzón, B. (2013). Comparative analysis of the sequentiality using SDIS-GSEQ and THEME: a concrete example in soccer. *Journal of Sports Sciences*, 31(15), 1687-1695. http://dx.doi.org/10.1080/02640414.2013.796061

López-Roldán, P. & Fachelli, S. (2015). Análisis de tablas de contingencia [Analysis of contingency tables]. In P. López-Roldán and S. Fachelli, *Metodología de la Investigación Social Cuantitativa*. Bellaterra: Universidad Autónoma de Barcelona.

Magnusson, M. S. (2020). T-Pattern Detection and Analysis (TPA) With THEMETM: A Mixed Methods Approach. *Frontiers in Psychology*, 10, 2663. https://doi.org/10.3389/fpsyg.2019.02663

Magnusson, M.S. (1996). Hidden real-time patterns in intra- and inter-individual behavior. *European Journal of Psychological Assessment, 12*(2), 112-123. https://doi.org/10.1027/1015-5759.12.2.112

Magnusson, M.S. (2000). Discovering hidden time patterns in behavior. T-patterns and their detection. *Behavior Research Methods, Instruments & Computers, 32*(1), 93-110. https://doi.org/10.3758/BF03200792

McKenzie, T. L., & Van Der Mars, H. (2015). Top 10 research questions related to assessing physical activity and its contexts using systematic observation. *Research Quarterly for Exercise and Sport, 86*(1), 13-29. https://doi.org/10.1080/02701367.2015.991264

Maksym, M., Oleg, K., Viacheslav, M., Larysa, T., Zhanna, G., Olena, T., ... & Iryna, P. (2018). Problems and features of technique in the development of coordination abilities of players specializing in wheelchair basketball. *Journal of Physical Education and Sport*, 18, 1016-1020. https://doi.org/10.7752/jpes.2018.s2150

Marjolaine, A., Weissland, T., Vallier, J.M., Pradon, D., Watelain, E., & Faupin, A. (2018). Effects of Synchronous versus Asynchronous Push Modes on Performance and Biomechanical Parameters in Elite Wheelchair Basketball. *Sports Engineering, 21*(1), 43-51. https://doi.org/10.1007/s12283-017-0245-y

Marszałek, J., Gryko, K., Kosmol, A., Morgulec-Adamowicz, N., Mróz, A., & Molik, B. (2019). Wheelchair Basketball Competition Heart Rate Profile According to Players' Functional Classification, Tournament Level, Game Type, Game Quarter and Playing Time. *Frontiers in Psychology, 10* (773). https://doi.org/10.3389/fpsyg.2019.00773.

Molik, B., Kosmol, A., Morgulec-Adamowicz, N., Laskin, J.J., Jezior, T., & Patrzałek, M. (2009). Game efficiency of elite female wheelchair basketball players during world championships (Gold Cup) 2006. *European Journal of Adapted Physical Activity, 2*(2), 26-38. https://doi.org/10.5507/euj.2009.007

Molik, B., Laskin, J.J., Golbeck, A.L., Kosmol, A., Rekowski, W., Morgulec-Adamowicz, N., … & Gómez, M.A. (2017). The International Wheelchair Basketball Federation's Classification System: The Participants' Perspective. *Kinesiology, 49*(1), 117-126. https://doi.org/10.26582/k.49.1.1

Molik, B., Laskin, J.J., Kosmol, A., Skucas, K., & Bida, U. (2010). Relationship between functional classification levels and anaerobic performance of wheelchair basketball athletes. *Research Quarterly for Exercise and Sport, 81*(1), 69-73. https://doi.org/10.1080/02701367.2010.10599629

Nunes, H., Iglesias, X., Daza, G., Irurtia, A., Caparrós, T., & Anguera M.T. (2015). The influence of pick and roll in attacking play in top-level basketball. *Cuadernos de Psicología del Deporte, 16*(1), 129-142.

Ortega, E. & Gómez, M.A. (2009). *Metodología observacional en baloncesto de formación [Observational methodology in grassroots basketball]*. Murcia: Diego Marín Librero-Editor.

PatternVision Ltd & Noldus Information Technology bv (2004). *Theme, powerful tool for detection and analysis of hidden patterns in behaviour*. Reference manual, version 5.0. Wageningen: Noldus Information Technology bv.

Pérez-Tejero, J. & Pinilla, J. (2015). Rendimiento del jugador de baloncesto en silla de ruedas según la estadística de juego [Wheelchair basketball player performance by game statistics]. *Cuadernos de Psicología del Deporte, 15*(3), 231-236. https://doi.org/10.4321/s1578-84232015000300027

Pérez-Tejero, J., Pinilla, J., Aceituno, J., & Sampedro, J. (2020). Análisis temporal y reglamentario en el baloncesto en silla de ruedas de alto nivel: conclusiones para el entrenamiento. [Time and reglamentary analysis during high level wheelchair basketball competition: training conclusions]. *SPORT TK-Revista EuroAmericana de Ciencias del Deporte, 9*(1), 7-14. https://doi.org/10.6018/sportk.412431

Peters, J., Rice, I., & Bull, T. (2020). Exploring the Influence of Wheelchair-User Interface and Personal Characteristics on Ischial Tuberosity Peak Pressure Index and Gradient in Elite Wheelchair Basketball Players. *Adapted Physical Activity Quarterly*, 37, 56-71. https://doi.org/10.1123/apaq.2019-0030

Refoyo, I., Romaris, I.U., & Sampedro, J. (2009). Analysis of men's and women's basketball fast-breaks. *Revista de Psicología del Deporte, 18*(3), 439-444.

Sasadai, J., Maeda, N., Shimizu, R., Kobayashi, T., Sakai, S., Komiya, M., & Urabe, Y. (2020). Analysis of team-sport wheelchair falls during the Rio 2016 Summer Paralympic Games: a video-based cross-sectional observational study. *BMJ Open*; 10:e033088. https://doi.org/10.1136/ bmjopen-2019-033088.

Serna, J., Muñoz, V., Hileno, R., Solsona, E., & Sáez, U. (2017). Patrones temporales iniciados con bloqueo directo o uno contra uno en baloncesto [T-patterns initiated with ball screen or one-on-one in basketball]. *Revista de Psicología del Deporte, 26*(3), 81-86.

Skordilis, E.K., & Stavrou, N.A. (2005). Sport orientation model for wheelchair basketball athletes. *Perceptual and Motor Skills, 100*(3_suppl), 1081-1096. https://doi.org/10.2466/pms.100.3c.1081-1096

Skučas, K., Stonkus, S., Molik, B., & Skučas, V. (2009). Evaluation of wheelchair basketball skill performance of wheelchair basketball players in different game positions. *Education. Physical Training. Sport*, 75, 65-69.

Suárez, J., Recio, P., San Luis, M.C., & Pozo, M.P. (2019). *Introducción al análisis de datos. aplicaciones en psicología y ciencias de la salud* [*Introduction to data analysis. applications in psychology and health sciences*]. Sanz y Torres.

Vanlandewijck, Y.C., Evaggelinou, C., Daly, D., Van Houtte, S., Verellen, J., Aspeslagh, V.,… Zwakhoven, B. (2003). Proportionality in wheelchair basketball classification. *Adapted Physical Activity Quarterly, 20*, 369-380. https://doi.org/10.1123/apaq.20.4.369

Vanlandewijck, Y.C., Evaggelinou, C., Daly, D., Verellen, J., Van Houtte, S., Aspeslagh, V., Hendrickx, R., Piessens, T., & Zwakhoven, B. (2004): The relationship between functional potential and field performance in elite female wheelchair basketball players. *Journal of Sports Sciences, 2*(7), 668-675. http://dx.doi.org/10.1080/02640410310001655750

Weissland, T., Faupin, A., Borel, B., & Leprêtre, P. M. (2015). Comparison between 30-15 intermittent fitness test and multistage field test on physiological responses in wheelchair basketball players. *Frontiers in Physiology, 6* (12), 1–8. https://doi.org/10.3389/fphys.2015.00380

Yeatts, P.E., Davis, R., Oh, J., & Hwang, G.Y. (2019). The Impact of Game Outcome on Affect of Military Wheelchair Basketball Players. *Adapted Physical Activity Quarterly, 36*(3), 378–387. https://doi.org/10.1123/apaq.2018-0164

Zacharakis, E. (2020). The effect of upper limb characteristics on palm strength, anaerobic power, and technical skills of wheelchair basketball players of varying classification. *Journal of Physical Education & Sport, 20*(2), 584–591. https://doi.org/10.7752/jpes.2020.02086