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Basketball game related statistics that discriminate between players with intellectual impairment and able-bodied players

Javier Pinilla Arbex*, Javier Pérez-Tejero* y Debbie Van Biesen**

BASKETBALL GAME RELATED STATISTICS THAT DISCRIMINATE BETWEEN PLAYERS WITH INTELLECTUAL IMPAIRMENT AND ABLE-BODIED PLAYERS

KEYWORDS: Eligibility, para-sport, classification, disability

ABSTRACT: The development of evidence-based eligibility systems in basketball for athletes with intellectual impairment (II) requires investigating the influence of II on performance. Due to this, the present study aimed to compare game-related statistics from II and able-bodied (AB) competitions. The World Men II-Basketball Championship 2013 (n=13 games and 63 players) and the Spanish Men AB-Basketball Championships 2014 under 16-years-old (n=10 games and 95 players) and under 18-years-old (n=18 games and 175 players) were analyzed. Team and individual statistics were normalized to 100 ball possessions and to 40 minutes played respectively. One-way ANOVA and *post hoc* Tukey tests were conducted to compare II and AB-teams. Also, a discriminant analysis was employed to identify which variables discriminated them best. The Kruskal-Wallis and U Mann-Whitney tests were applied to compare the II and AB individual game-related statistics. II-teams played more ball possessions per game ($p<0.05$) and the variables which best discriminated II and AB-teams were: 2-point unsuccessful shots | SC=-0.384 | , 3-point successful | SC=0.456 | , 3-point unsuccessful | SC=-0.399 | , free-throws successful | SC=0.319 | and fouls | SC=0.454 | . In all playing positions II-players presented more 2-point unsuccessful and lower shooting percentage in all kind of shots. II-guards attempted more field shots and made more turnovers than their peers, showing an unbalanced roles' distribution compared with AB-players. These results confirmed that II and AB-players perform basketball in different ways.

Recent studies have demonstrated the negative influence of intellectual impairment (II) on performance in sports such as track and field, swimming and table-tennis (Burns, 2015; Van Biesen, Mactavish, Pattyn and Vanlandewijck, 2012; Van Biesen, Mactavish and Vanlandewijck, 2013). Thus, organizing specific sport competitions for II-athletes seems necessary to provide them the opportunity to reach sport excellence in equal conditions (IPC, 2015). To be eligible for II-competition, the impairment of the II-athletes should be documented and the impact of II on sport-specific performance should be proven (IPC, 2015; Tweedy and Vanlandewijck, 2011). This is proven by eligibility systems which were developed for each sport based on how impairment negatively impacts on performance in each sport. Moreover, these systems are required for all sports included in the Paralympic program. As these systems were developed in table tennis, swimming and track and field, participation of II-athletes returned to the Paralympics in London 2012, creating a new class for II-athletes in each of these sports (Burns, 2015). In II-basketball, these systems have not been developed yet. Current eligibility is based on primary eligibility check, which proves that athletes present the diagnosis of intellectual disability, but they are not based on sport-specific criteria. Due to this fact, to develop these systems is relevant to guarantee that only athletes having significant limitations to perform basketball participate in specific II-competitions. Also, developing these systems is relevant to re-

include II-basketball in the Paralympic program. This article is a contribution to the development of these systems, studying the impact of II on basketball performance.

Performance in basketball is about defeating your opponent. According to the Official Rules (FIBA, 2014; p.5), "The team that has scored the greater number of points at the end of playing time shall be the winner". Performance depends on multiple interactions between teammates and opponents in which both individual and collective actions are relevant (García, Ibáñez, Cañadas and Antúnez, 2013). Technique, tactics and strategy are key components of basketball performance (Sampedro, 1999); but they also depend on individual capacities in different areas: fitness, cognition and psychological skills (Refoyo, Sampedro and Sillero, 2009). Different studies highlighted that intellectual functioning is relevant to perceive a situation, to decide and to carry out effective motor solutions (García et al., 2013; Tenenbaum, 2003). Jakovljevic (1996) demonstrated that perceptive differentiation and logical conclusions were the cognitive abilities best related with success in basketball.

Previous studies in II-basketball found significant relationship between athletes' intellectual quotient and proficiency in four basketball skills: ball handling, reception, pass and shooting (Guidetti, Franciosi, Emerenziani, Gallotta and Baldari, 2007). However, another study pointed out that II influences more negatively tactics than technique (Polo, Pinilla, Pérez-Tejero and

Vanlandewijck, 2014). In this line, a recent study compared II and AB-players' capacity to solve eight standardized basketball game situations played on court (Pinilla et al., 2016). In this study, II-players decided slower, made more dribbles and ended the situations less successfully (scoring or giving a correct pass). According to these evidences, II might negatively influence performance during competition.

Pérez-Tejero, Pinilla and Vanlandewijck (2015) compared game-related statistics in high-level II-basketball competitions between successful and unsuccessful teams. In this study authors discussed that II-teams seemed to present lower shooting percentages, more rebounds and more turnovers than AB-teams in previous studies from the literature (Gómez, Lorenzo, Ortega, Sampaio and Ibáñez, 2009; Trninic, Dizdar and Luksic, 2002). A further study found that variability of game-related statistics in II-competitions was higher than in AB-competitions, suggesting that II-players' performance was more dispersed (Pinilla, Pérez-Tejero, Van Biesen and Vanlandewijck, 2015). The aforementioned studies seem to indicate that II and AB-players played basketball in a different way, probably influenced by II. However, these differences were based on the comparison of different studies, not being possible to calculate statistical differences. In this study, data from II and AB-competitions were collected and analyzed by the same researches and the statistical analysis could be done based on the raw data of both the II and AB sample. The aim of the present study was to explore the differences in team and individual game-related statistics between II and AB-competitions and to identify which variables best discriminate them. The hypothesis is that game-related statistics from II and AB-players competitions will present significant differences, showing different ways to perform basketball.

Method

Sample and variables

Data were collected from the Men's II-Basketball World Championships (Turkey, 2013) and from the Spanish Men's AB-Championships under 16-years-old (U-16) and under 18-years-old (U-18) held in 2014. Number of games and participants were: II-championships, 13 games (all games played), six teams and 63 players; U-16, 10 games (from 1/4 finals on), 8 teams and 95 players and U-18, 18 games (from 1/8 finals on), 16 teams and 175 players. The following game-related statistics were gathered per team and player in each game: two-point shots successful, unsuccessful and percentage; three-point shots successful, unsuccessful and percentage; free throws successful, unsuccessful and percentage; offensive rebounds, defensive rebounds, assists, fouls, steals, turnovers, blocks and points scored. These variables were gathered through *FIBA Live Statistics Software* by experienced officials who followed the International Basketball Federation descriptors of each variable (FIBA, 2005). Also, playing position and minutes played per player were gathered in each game. Only players who participated more than 10 minutes during the game were included in the analysis. Consequently, number of observations (statistics from one player in one game) included in this study was: 194 from II-players (Guards = 42, Forwards = 85, Centers = 67) and 438 from AB-players (Guards = 107, Forwards = 194, Centers = 137). To check reliability of game-related statistics a sub-sample of 10% of the games were randomly selected and analyzed by an expert in basketball analysis with more than five years' experience.

Intraclass Correlation Coefficients (ICC) obtained was higher than 0.94 in all variables.

Data processing

Team variables per game were normalized to 100 ball possessions played in order to account for game rhythm contamination, allowing to compare teams' efficiency per ball possession even between different games (Gómez, Lorenzo, Sampaio, Ibáñez and Ortega, 2008). Team variables were divided by the number of ball possessions played during the game and multiplied by 100. Oliver's equation (2004) was used to calculate ball possessions (BP): $BP = (\text{field-goals attempted}) - (\text{offensive rebounds}) + (\text{turnovers}) - 0.4 \times (\text{free-throws attempted})$. Individual variables from each game were normalized to 40 minutes played in order to compare player's performances independently the time played (Vanlandewijck et al., 2004).

Statistical Analyses

The following descriptive statistics were calculated from team and individual variables: mean, standard deviation, range, variance and variability coefficient. The Shapiro-Wilk and Kolmogorov-Smirnov tests were performed to explore the normality of team statistics ($n < 50$) and individual statistics ($n > 50$) respectively. Normal distribution was confirmed in the team variables but not in the individual variables. To compare II, U-16 and U-18 team game-related statistics one-way ANOVA and *post hoc* Tukey tests were employed. Brown-Forsythe robust test complemented this analysis to avoid assumptions of type I errors. In order to analyze the effect size (ES) of the differences between samples, eta-square was calculated. In addition, different discriminant functions were calculated to identify which variables discriminated best between II and AB-teams. The structural coefficients (SC's) obtained from the discriminant functions were used to identify these variables (Ntoumanis, 2001). Level of significance for the discrimination was set at SC above $|0.30|$ (Tabachnick and Fidell, 2005). Kruskal-Wallis test was employed to identify differences in individual game-related between the three groups of players (guard, forward and center) from II and AB-players. U-Mann Whitney tests were used to explore paired-matched differences between two playing positions from the same sample and to compare II and AB individual statistics from players in the same playing positions. In order to identify the effect size of individual differences, Cliff's Delta was calculated (Macbeth, Razumiejczyk and Ledesma, 2011). Statistical analyses were performed using PASW statistics 20 (SPSS Inc., Chicago, IL, USA). Statistical significance was set at $p < .05$.

Results

In Table 1, descriptive game-related statistics from II, U-16 and U-18-teams are presented and compared through one-way ANOVA and *post hoc* Tukey test, indicating significant differences ($p < .05$) between II and AB-team statistics in different variables.

Based on the mean number of ball possessions played per game, the calculated mean length of ball possessions in each competition was: 16.98 ± 3.0 seconds in II-teams, 20.31 ± 3.3 seconds in U-16 teams and 20.41 ± 2.8 seconds in U-18 teams. Regarding variability of game-related statistics, variability coefficient was 50.7% in II-teams, 41.1% in U-16 teams and 38.6% in U-18 teams. This coefficient seemed to decrease as the level of competition increased. However, no significant differences were found between the three groups ($p > .05$).

In Table 2 it is presented the SCs values of the game-related statistics obtained from the different discriminant functions calculated: a comparison of II with all AB-teams and an independent comparison of II-teams with U-16 and U-18

teams. The three calculated functions were significant ($p < 0.001$) and SCs over above $|0.30|$ indicates the variables that significantly contributed to discriminate AB and II-team's statistics.

Variable	II-teams	U-16-teams	U-18-teams	F	ANOVA	ES η^2
Possessions	72.9 (12.8)	60.7 (9.9)	59.9 (8.1)	13.86*	II>U-16, U-18	0.26
2-pt successful	25.7 (10.4)	30.4 (7.7)	31.8 (9.2)	3.43*	U-18>II	0.08
2-pt unsuccessful	52.6 (12.0)	46.8 (13.5)	37.0 (8.7)	15.6*	II>U-18	0.28
2-pt percentage	32.8 %	39.4 %	46.2 %			
3-pt successful	4.6 (3.6)	9.4 (4.7)	11.5 (5.7)	15.5*	U-16, U-18>II	0.28
3-pt unsuccessful	17.8 (8.3)	25.6 (8.9)	27.4 (8.0)	10.5*	U-16, U-18>II	0.21
3-pt percentage	20.5 %	26.9 %	29.6 %			
FT successful	13.7 (9.1)	22.3 (10.8)	24.8 (14.0)	6.84*	U-16, U-18>II	0.148
FT unsuccessful	13.4 (9.5)	13.4 (8.3)	12.7 (5.8)	0.07		0.00
FT percentage	50.6 %	62.5 %	66.1 %			
Off. Reb.	22.5 (10.4)	26.6 (17.9)	20.2 (9.9)	1.7		0.04
Def. Reb.	41.6 (16.1)	41.7 (11.2)	41.7 (13.2)	0.00		0.00
Assists	15.3 (9.8)	16.8 (6.4)	19.4 (8.2)	1.93		0.05
Fouls	25.5 (6.9)	33.9 (6.7)	36.5 (9.6)	14.00*	U-16, U-18>II	0.26
Steals	16.5 (8.9)	15.7 (6.3)	15.1 (5.9)	0.33		0.01
Turnovers	32.6 (14.6)	28.7 (10.3)	27.5 (9.3)	1.51		0.04
Blocks	4.8 (4.4)	6.4 (5.2)	4.8 (3.4)	1.12		0.03

* $p < .05$

Table 1. Descriptive game-related statistics normalized to 100 ball possessions and ANOVA between II, U-16 and U-18 competitions.

Game-related statistics	II and all AB teams	II and U-16	II and U-18
2-pt successful	.227	.207	.177
2-pt unsuccessful	-.384*	-.187	-.429*
3-pt successful	.456*	.474*	.394*
3-pt unsuccessful	.399*	.369*	.329*
Free-throws successful	.319*	.352*	-.225
Free-throws unsuccessful	-.023	-.004	-.025
Defensive rebounds	.002	.003	.001
Offensive rebounds	.001	.119	-.062
Assists	.141	.070	.130
Steals	-.067	-.045	-.057
Turnovers	-.151	-.123	-.120
Blocks	.052	.138	.001
Fouls	.454*	.499*	.357*
Eigenvalue	1.613	1.558	3.206
Wilk's Lambda	.383	.391	-.238
Canonical Correlation	.786	.78	.87
Chi-squared	71.069	35.7	77.57
Significance	0.001	0.001	0.001
Reclassification	95.1%	95.7%	96.8%

* SC discriminant value $> |0.30|$

Table 2. Discriminant analysis SC from II and AB-teams (U-16 and U-18).

The comparison between II and AB-individual statistics showed that in the three playing positions (guard, forward, center), II-players committed significantly ($p < .05$) more 2-point unsuccessful and that AB-players scored more 3-point shots. Descriptive game-related statistics per 40 minutes played and significant differences ($p < .05$) between II and AB-players per

playing position and between positions from the same sample (II or AB) are presented in Table 3.

The calculated variability coefficients indicated that mean variability in all variables were higher in II-players in all playing positions (II-guards: 113.7% vs AB-guards: 95.8%; II-forwards: 114.4% vs AB-guards: 100.1% and II-centers: 108.5% vs AB-

Variable	Guard (g)			Forward (f)			Center (c)			Intra-sample differences				
	II-players	AB-players	Sig.	ES Cliff	II-players	AB-players	Sig.	ES Cliff	II-players	AB-players	Sig.	ES Cliff II	ES Cliff AB	ES Cliff
Minutes	28.7 (9.8)	23.2 (6.8)	II>AB	0.33	24.2 (9.2)	23.0 (7.0)			25.5 (8.2)	21.2 (7.3)	II>AB	0.29	G>F 0.26	G, F>C 0.16
2-pt successful	4.1 (3.1)	2.6 (2.3)	II>AB	0.43	2.9 (3.2)	3.7 (3.3)	AB>II	0.17	3.8 (3.6)	4.6 (3.3)			G>F 0.24	C>F>G 0.36
2-pt unsuccessful	8.3 (6.9)	4.5 (3.4)	II>AB	0.34	6.7 (5.0)	4.8 (3.4)	II>AB	0.21	7.1 (4.0)	5.1 (3.5)	II>AB	0.28		
2-pt percentage	33.1 %	36.6%			30.2%	43.5%			34.9 %	47.4 %				
3-pt successful	0.9 (1.3)	1.6 (1.7)	AB>II	0.23	0.9 (1.6)	1.5 (2.0)	AB>II	0.19	0.2 (0.5)	0.5 (1.1)	AB>II	0.12	G, F>C 0.24	F>C 0.30
3-pt unsuccessful	3.6 (4.4)	4.1 (3.2)			3.2 (3.5)	3.6 (3.2)			0.6 (1.0)	1.6 (2.0)	AB>II	0.24	G, F>C 0.51	G, F>C 0.45
3-pt percentage	20%	28.1%			22.0 %	29.4 %			25%	23.8 %				
FT successful	2.3 (2.7)	2.9 (2.8)			1.7 (2.6)	2.8 (3.3)	AB>II	0.20	1.5 (2.1)	2.3 (3.1)				
FT unsuccessful	2.3 (2.8)	1.1 (1.4)	II>AB	0.27	1.5 (2.1)	1.5 (2.2)			2.2 (2.9)	1.6 (2.3)				
FT percentage	50%	72.5 %			53.2 %	65.1 %			40.5 %	59.0 %				
Offensive rebounds	1.9 (2.4)	1.1 (1.6)			2.5 (2.9)	2.7 (3.1)			4.7 (4.1)	3.8 (3.3)			C>G, F 0.38	C>F>G 0.55
Defensive rebounds	5.1 (4.4)	3.8 (2.9)			4.2 (3.9)	4.8 (4.2)			7.8 (4.7)	5.8 (4.1)	II>AB	0.25	C>G, F 0.47	C>G, F 0.22
Assists	3.8 (4.5)	3.4 (2.8)			1.9 (2.0)	2.1 (2.2)			1.3 (1.5)	1.1 (1.6)			G>F, C 0.26	G>F>C 0.54
Fouls	3.6 (3.1)	4.1 (3.0)			3.6 (2.7)	3.9 (2.8)			4.7 (3.5)	5.1 (3.7)			C>F 0.28	C>G, F 0.18
Steals	2.9 (2.9)	2.3 (2.2)			2.5 (2.6)	2.0 (1.9)			1.8 (1.7)	1.2 (1.5)	II>AB	0.19		G, F>C 0.24
Turnovers	6.8 (5.3)	4.3 (3.3)	II>AB	0.24	3.8 (3.6)	2.9 (2.4)			4.3 (3.8)	3.0 (2.6)			G>F, C 0.30	G>F, C 0.24
Blocks	0.4 (1.3)	0.3 (0.7)			0.3 (0.7)	0.5 (1.0)	AB>II	0.13	1.2 (1.8)	0.9 (1.5)			C>G, F 0.30	C>G 0.17
Points	13.1 (8.0)	12.7 (6.6)			10.2 (9.4)	14.5 (9.7)	AB>II	0.13	9.7 (8.3)	12.9 (8.4)	AB>II	0.23	G>F, C 0.23	

* Significant differences ($p < 0.05$)

Table 3. Descriptive individual game-related statistics related to 40 minutes played and significant differences between II and all AB-players (both U-16 and U-18) according to player's position.

centers: 107.8%). However, these differences were not significant ($p > .05$). A comparison of number of field shots attempted by II and AB-players per playing positions is presented in figure 1. II-guards attempted significantly more two-point shots than AB-guards ($p < 0.05$) and in the three playing positions, AB-players took more three-point shots.

The aim of the present study was to compare individual and team game-related statistical indicators of performance between II and AB-competitions. In line with the established hypothesis and with conclusions from previous studies (Pérez-Tejero et al., 2015), results confirmed that II and AB-players presented significant differences performing basketball during competition, showing that II and AB-players perform basketball in different ways.

Differences in number of possessions indicated that game rhythm in II-games was higher than in AB-games. The relationship between game rhythm and success was not significant in other studies (Ibáñez et al., 2008), but some authors indicated that playing a higher pace leads to more unforced errors (García, Ibáñez, Martínez, Leite and Sampaio, 2013). Playing more ball possessions per game indicates that II-players spent less time during the offensive phases until they shot. Probably, they employed less collective actions, they made more errors (Lorenzo, Gómez, Ortega, Ibáñez and Sampaio, 2010) or they just executed faster than AB-players the same number of actions. However, the lower shooting percentages of II-teams and the lack of differences found in number of turnovers or steals per ball possession between II and AB-teams suggest that the higher game rhythm in II-teams might be consequence of a poorer shot selection. Also, a lower shooting efficiency might be explained by a higher defensive pressure. Nevertheless, the lower number of fouls made by II-teams does not support this fact. Probably, II-players shot fast even with low defensive pressure, not tiring out the defenders by penetrating neither interacting with their teammates to prepare the shot (Gómez et al., 2009). It seems that II-players played "in a hurry", probably

as a consequence of lower tactical discipline or limitations in problem solving capacity (Trninic et al., 2002; Pinilla et al., 2016).

Percentage in free-throws, in which shooting selection is not so much involved, was also lower in II-teams. This could be explained by possible limitations of II-athletes to concentrate, to perform an efficient technique (Gómez et al., 2009), to have good confidence (Trninic et al., 2002) or by employing less time training this skill. Number of 3-point shots scored and missed by II-teams was lower and also discriminated between II and AB-teams. This result suggests the balance between inside and outside actions differences II and both U-16 and U-18 teams performing basketball; II-teams playing closer to the basket. As Trninic et al. (2002) manifested, systems of play of the successful teams contain balance between inside and outside play, providing good opportunities to draw fouls, to carry out 3-point power plays and to have more chances to get offensive rebounds.

Comparing II-teams' statistics with both U-16 and U-18 teams independently, it was detected that differences grew bigger and variability was reduced when results were compared with U-18 teams. With regards to previous studies, it seems that performance becomes more compacted (less variability) and differences between II and AB-teams bigger while the level of competition increases (Pérez et al., 2015; Pinilla et al., 2015). As a methodological issue, it is important to take into consideration that normalizing game-related statistics to 100 ball possessions, differences refer to how II and AB-teams play each ball possession. However, as number of ball possessions was significantly higher in II-teams in this study; probably, if two AB and II-games were compared directly, it might occur that several variables are higher in II-players (e.g. turnovers, steals, shots missed, etc...) because the influence of game rhythm but not as a result of lower efficiency presented in each ball possession.

Individual analysis provided deeper information about how II and AB-players perform basketball per playing position. In this

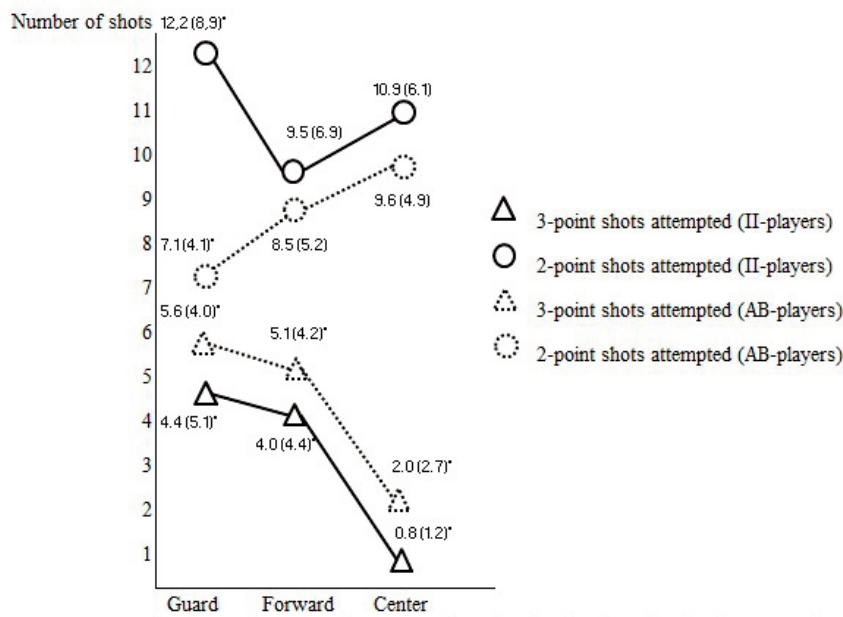


Figure 1. Comparison of field shots attempted by II and AB-players per playing position

point it is important to take into account that individual results refer to 40 minutes played. Also, players were observed in different games; consequently, the same player could present different ranges of performance throughout different games instead of a mean value from all the games. According to this, it was observed that individual performance variability was high in both AB and II-samples and game-related statistics did not follow a normal distribution.

In all playing positions was observed that II-players missed more 2-point shots, they presented lower shooting percentages and AB-players scored more 3-point shots. These results seem to support team's results. In the sample of AB-players, the closer to the basket the playing position was, the number of two-point shots attempted increased and three-point shots attempted decreased, showing a clear distribution of playing roles (Escalante, Saavedra and García-Hermoso, 2010). However, II-players did not follow the same distribution, especially analyzing two-point shots attempted in guards. These results suggest that II- guards, as responsible of handling and distributing the ball, might not distribute the ball as much as AB-players. Probably, they decided to shoot more times instead of passing the ball to reach better shooting opportunities (Sampaio, Janeira, Ibáñez and Lorenzo, 2006). In addition, the higher number of total field goals attempted by II-forwards compared with II-centers seems to point out that guard's behavior was reproduced by forwards when they received the ball, providing II-guards with fewer opportunities to shoot. This seems to support the idea that reduced time per ball possession found in II-teams could be due to II-player's decision to shoot fast with reduced number of collective actions. This fact also seems to unbalance the points contribution per playing position compared with AB-players.

The higher number of turnovers presented by II-guards, as responsible to handle the ball, could be consequence of lower skills and difficulties on problem solving capacity, decision-making, anticipation or the lack of a controlled style of play

(García et al., 2013; Lorenzo et al., 2010) that usually involves more bad passes and poor dribbling skills (Gómez et al., 2009). Moreover, an excessive use of ball dribbling, normally presented in less effective teams (Gómez et al., 2006), could increase turnovers and steals. In this line, II-centers stole higher number of balls than AB-centers. Although steals represents a measure of defensive pressure (Gómez et al., 2009; Ibáñez et al., 2008); limited offensive skills or tactics could provide the opponents with more opportunities to steal the ball. In addition, a consequence of steals and turnovers could be a high number of fast breaks, increasing the number of ball possessions in II-games and the high number of shots attempted by II-guards with relative high success (Sampaio et al., 2006).

The statistical contrast performed in this study comparing II and AB-team and individual game-related statistics provides innovative insight for better understanding the influence of II on basketball performance as it is needed to develop evidence-based eligibility systems for this sport (Tweedy and Vanlandewijck, 2011).

Conclusions

This study confirmed the game-related statistics from II and AB-players during competition differ significantly in several variables, showing differences in the way II and AB-players perform basketball. II-teams were characterized by playing higher game rhythm, obtaining lower shooting percentages, attempting and scoring less 3-point shots and by making less fouls per ball possession. In addition, individual results showed unbalanced distribution of roles in II-players compared with AB-players. II-guards attempted more shots and made more turnovers than their peers. These results could be consequence of a negative influence of II to carry out activities which are fundamental performing this sport as e.g.: to read the situations, to make decisions or to elaborate team actions. Results from this study provide scientific evidences that contribute to develop eligibility systems in II-basketball and contributes to orientate further research

ESTADÍSTICAS DE JUEGO EN BALONCESTO QUE DISCRIMINAN ENTRE JUGADORES CON Y SIN DISCAPACIDAD INTELECTUAL

PALABRAS CLAVE: Elegibilidad, para-deporte, clasificación, discapacidad.

RESUMEN: El desarrollo de sistemas de elegibilidad basados en la evidencia en baloncesto para deportistas con discapacidad intelectual (DI) requiere investigar la influencia de la DI en el rendimiento. Debido a ello, el presente estudio tuvo por objetivo comparar las estadísticas de juego en competiciones para personas con DI y sin discapacidad (SD). El Campeonato del Mundo de Baloncesto-DI de 2013 (n=13 partidos y 63 jugadores) y los Campeonatos de España de Baloncesto-SD de 2014 sub-16 (n=10 partidos y 95 jugadores) y sub-18 (n=18 partidos y 175 jugadores) fueron analizados. Las estadísticas de equipo e individuales fueron normalizadas a 100 posesiones de balón y 40 minutos de juego respectivamente. Los test one-way ANOVA y *post hoc* Tukey fueron utilizados para comparar los equipos con DI y SD. También se realizó un análisis discriminante para identificar qué variables los discriminaban mejor. Los test Kruskal-Wallis y U Mann-Whitney fueron empleados para comparar las estadísticas individuales de los jugadores con DI y SD. Los equipos con DI jugaron más posesiones de balón por partido ($p < 0.05$) y las variables que más discriminaron los equipos con DI y SD fueron: lanzamientos de 2 puntos fallados $|SC = -0.384|$, 3 puntos encestandos $|SC = 0.456|$, 3 puntos fallados $|SC = -0.399|$, tiros libres encestandos $|SC = 0.319|$ y faltas $|SC = 0.454|$. En todas las posiciones de juego los jugadores con DI presentaron más fallos de 2 puntos y menor porcentaje de tiro en todo tipo de lanzamientos. Los bases con DI intentaron más lanzamientos de campo y cometieron más pérdidas que sus compañeros, mostrando un desequilibrio entre la distribución de roles comparado con los jugadores SD. Estos resultados confirmaron que los jugadores con DI y SD rinden de manera diferente en baloncesto.

Referencias

- Burns, J. (2015). The impact of intellectual disabilities on elite sports performance. *International Review of Sport and Exercise Psychology*, 8, 251-267. doi: 10.1080/1750984X.2015.1068830
- Cárdenas, M. and Arancibia, H. (2014). Potencia estadística y cálculo del tamaño del efecto en G*power: complementos a las pruebas de significación estadística y su aplicación en psicología. *Salud y Sociedad*, 5, 210-224
- Escalante, Y., Saavedra, J. M. and García-Hermoso, A. (2010). Game-related statistics in basketball by player position and final game score differences in European Basketball Championship 2007. *Fitness and Performance Journal (Online Edition)*, 9, 50-56.
- FIBA. (2014). *Official basketball rules*. Barcelona: FIBA.
- García, J., Ibáñez, S. J., Cañadas, M. and Antúnez, A. (2013). Complex system theory in team sports. Example in 5 on 5 basketball contest. *Revista de Psicología del Deporte*, 22, 209-213.
- García, J., Ibáñez, S. J., Martínez, R., Leite, N. and Sampaio, J. (2013). Identifying basketball performance indicators in regular season and playoff games. *Journal of Human Kinetics*, 37, 163-170.
- Gómez, M. A., Lorenzo, A., Ortega, E., Sampaio, J. and Ibáñez, S. J. (2009). Game related statistics discriminating between starters and nonstarters players in Women's National Basketball Association League (WNBA). *Journal of Sport Science and Medicine*, 8, 278-283.
- Gómez, M. A., Lorenzo, A., Sampaio, J., Ibáñez, S. J. and Ortega, E. (2008). Game-related statistics that discriminated winning and losing teams from the Spanish men's professional basketball teams. *Collegium Antropologicum*, 32, 451-456.
- Guidetti, L., Franciosi, E., Emerenziani, G. P., Gallotta, M. C. and Baldari, C. (2007). Assessing basketball ability in players with mental retardation. *British Journal of Sports Medicine*, 43, 208-212. doi: 10.1136/bjism.2006.034918
- Ibáñez, S. J., Sampaio, J., Feu, S., Lorenzo, A., Gomez, M. A. and Ortega, E. (2008). Basketball game-related statistics that discriminate between teams' season-long success. *European Journal of Sport Science*, 8, 369-372.
- IPC. (2015). *IPC Classification code*. Bonn.
- Jakovljevic, S. (1996). Simultaneous influence of the specific basketball motoric and cognitive abilities on success of basketball. *Facta Universitatis: Series Physical Education and Sport*, 1, 91-98.
- Lorenzo, A., Gómez, M. A., Ortega, E., Ibáñez, S. J. and Sampaio, J. (2010). Game related statistics which discriminate between winning and losing under-16 male basketball games. *Journal of Sports Science and Medicine*, 9, 664-668.
- Macbeth, G., Razumiejczyk, E. and Ledesma, R. D. (2011). Ciff's Delta Calculator: A non-parametric effect size program for two groups of observations. *Universitas Psychologica*, 10, 545-555.
- Oliver, D. (2004). *Basketball on paper: Rules and tools for performance analysis*. Washinton, D.C.: Brassey's, Inc.
- Pérez-Tejero, J., Pinilla, J. and Vanlandewijck, Y. (2015). Perfil del rendimiento en el campeonato del mundo de baloncesto (Ankara 2013) para personas con discapacidad intelectual: Implicaciones en el sistema de elegibilidad. *Revista Iberoamericana de Psicología del Ejercicio y el Deporte*, 10, 187-192.
- Pinilla, J., Pérez-Tejero, J., Sampedro, J., Refoyo, I., Lorenzo, A., Lorenzo, J., . . . Vanlandewijck, Y. (2016). Influence of intellectual impairment (II) on basketball players' capacity to solve a game situation: towards evidence-based classification systems in II-basketball. *Psychology, Society and Education*, 8, 121-134.
- Pinilla, J., Pérez-Tejero, J., Van Biesen, D. and Vanlandewijck, Y. (2015). Performance variability in basketball players with intellectual impairment: Ankara World Championships 2013 analysis. *Revista de Psicología del Deporte*, 24, Suppl 1, 77-83.
- Polo, I., Pinilla, J., Pérez-Tejero, J. and Vanlandewijck, Y. (2014). *Coaches' opinion about game difficulties experienced by basketball players with intellectual disability*. Paper presented at the European Congress of Adapted Physical Activity, Madrid.
- Refoyo, I., Sampedro, J. and Sillero, M. (2009). The relationship between exercise intensity and performance in drills aimed at improving the proficiency, technical and tactical skills of basketball players. RICYDE. *Revista Internacional de Ciencias del Deporte*, 1-10.
- Sampaio, J., Janeira, M. A., Ibáñez, S. J. and Lorenzo, A. (2006). Discriminant analysis of game-related statistics between basketball guards, forwards and centres in three professional leagues. *European Journal of Sport Science*, 6, 173-178.

- Sampedro, J. (1999). *Fundamentos de la Táctica deportiva*. Análisis de la estrategia de los deportes. Madrid: Gymnos.
- Tenenbaum, G. (2003). Expert athletes: an integrated approach to decision making In J. L. Starkes and K. A. Ericsson (Eds.), *Expert Performance in Sports: Advances in Research on Sport Expertise* (pp. 191-218). United States of America: Human Kinetics.
- Trinic, S., Dizdar, D. and Luksic, E. (2002). Differences between winning and defeated top quality basketball teams in final tournaments of European club championship. *Collegium Antropologicum*, 26, 521-531.
- Tweedy, S. M. and Vanlandewijck, Y. C. (2011). International Paralympic Committee position stand—background and scientific principles of classification in Paralympic sport. *British Journal of Sports Medicine*, 45, 259-269.
- Van Biesen, D., Mactavish, J., Pattyn, N. and Vanlandewijck, Y. (2012). Technical proficiency among table tennis players with and without intellectual disabilities. *Human Movement Science*, 31, 1517-1528.
- Van Biesen, D., Mactavish, J. and Vanlandewijck, Y. (2013). Tactical proficiency among table tennis players with and without intellectual disabilities. *European Journal of Sport Science*, 14, 403-409. doi: 10.1080/17461391.2013.825645
- Vanlandewijck, Y. C., Evaggelidou, C., Daly, D. J., Verellen, J., Houtte, S. V., Aspeslagh, V., . . . Zwakhoven, B. (2004). The relationship between functional potential and field performance in elite female wheelchair basketball players. *Journal of Sports Sciences*, 22, 668-675.