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Original

EFECTO DE LA EDAD RELATIVA EN BALONCESTO. EL CASO DE JUGADORES PROFESIONALES DE BALONCESTO DE CHINA

RELATIVE AGE EFFECT ON BASKETBALL. THE CASE OF CHINESE PROFESSIONAL BASKETBALL PLAYERS

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RESUMEN

La Edad Relativa (RA) consiste en una asimetría en la distribución de la natalidad, que implica una sobrerrepresentación de las personas nacidas en los primeros meses del año. Fuera de Europa, los antecedentes y la investigación sobre este tema no son tan consistentes, especialmente en el campo deportivo. China alberga la Asociación China de Baloncesto (CBA), que es la principal liga de baloncesto de Asia. En el presente estudio analizamos la existencia de Edad Relativa en la CBA durante la temporada 2017/2018. Los participantes fueron jugadores profesionales de baloncesto que tomaron parte de dicha competición (n=318) con una edad promedio de 26,98 ± 4,18 años. Se constató la existencia de RA para todos los jugadores en conjunto (p<0,001). Analizando a los jugadores por su posición en el campo, se encontró RA en bases y escoltas (p<0,001). La mayor manifestación de RA en estas posiciones podría explicarse por los requisitos físicos y de rendimiento específicos de los bases y escoltas. Nuestros resultados sugieren que China no es una excepción en el sesgo existente sobre la selección de talento en función de la fecha de nacimiento de los jugadores, lo que genera desigualdad de oportunidades en las primeras categorías.

Palabras clave: baloncesto, fecha de nacimiento, edad relativa, sesgo, rendimiento deportivo.

ABSTRACT

The Relative Age (RA) consists of an asymmetry in the birth distribution, involving an overrepresentation of people born in the first months of the year playing different activities. Out of Europe, the background and research on this topic are not as consistent, especially in the sports field. China hosts the Chinese Basketball Association (CBA), which is the main basketball league in Asia. Thus, in the present study, we analyzed the existence of the Relative Age in the CBA during the season 2017/2018. Participants were professional basketball players who participated in the competition (n=318) with an average age of 26.98 ± 4.18 years. The existence of RA was found for all players analyzed (p<0.001). Analyzing the players by their position on the pitch, RA was found at point guards and shooting guards (p<0.001). The greater existence of RA on these positions could be explained by the specific physical and performance requirements of point guards and shooting guards. Our results suggest that China is not an exception in the existing bias about the selection of talent based on the date of birth of players, which generates unequal opportunities in early categories.

Keywords: basketball, birthdate, relative age; selection bias; sport performance.

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INTRODUCTION

Talent identification is a typical concern within the scope of sports. Athletes are usually grouped by their age of birth during their early ages, following an annual or biannual classification. This follows the usual cutoff criterion of most of the school systems (Musch & Grondin, 2001). However, this method does not allow allocating them according to their level of maturity (physical or psychical) or their potential. This entails a problem for the sports systems of the different countries since some emerging talents are not allowed to develop their full potential and never reach the top level.

This situation is known as the Relative Age (RA) and consists of an asymmetry in the birth distribution, involving an overrepresentation of players born in the first months of the year (Gonzalez-Bertomeu, 2018; Helsen et al., 2012). This difference can produce the potential disadvantage known as the Relative Age Effect (RAE) (Saavedra & Saavedra, 2020). Although the RA and RAE have always existed, it was first examined in hockey and volleyball by Grondin et al. (1984) and later by Barnsley et al. (1985). Since then, the RA has been explored resulting in diverse meta-analyses, literature reviews (Cobley et al., 2009; Rubia et al., 2020b), and bibliometric analysis (Bilgiç & Işın, 2022). Likewise, specific work on different team sports has been performed, such as soccer (Musch & Grondin, 2001; Towlson et al., 2021), rugby (Lemez et al., 2016; Till et al., 2009), handball (Rubia et al., 2020a), Australian football (Tribolet et al., 2019), futsal (Lago-Fuentes et al., 2020) and baseball (Nakata & Sakamoto, 2013). Individual sports have also been examined, including athletics (Brustio & Boccia, 2021; Sasano et al., 2020), tennis (Ulbricht et al., 2015), golf, horse racing, sumo, badminton (Nakata & Sakamoto, 2013), alpine ski racing (Müller et al., 2015) or swimming (Cobley et al., 2019).

Basketball has received special attention regarding the RA. This phenomenon provides young players with greater physical, emotional, and cognitive development which allows a better sports performance (Rubia et al., 2020a; Wattie et al., 2008), maximized by the biannual competitive structure that rules the youth basketball competitions system of most national basketball federations. Previous research has explored the presence of the RA at different stages of the development pathway for young basketball players, with a special focus on their early and mid-stages towards elite status, (i.e., U12, U15, U16, U17, and U18) (Diaz-Aroca & Arias-Estero, 2022; Pino-Ortega et al., 2022; Rubia et al., 2020a; Torres-Unda et al., 2016; Vegara-Ferri et al., 2019). Due to the sports characteristics, not only psychological maturity is important but also kinematic performance (Pino-Ortega et al., 2022) and physical development, such as height (Arrieta et al. 2016). One prospect can reach between 8-12 centimeters at their height growth pick in one year, subsequently, the difference between those born in the first part of the year versus the ones born in the last part of the year could be as much as 10 centimeters (Arrieta et al., 2016). Previous work has proved the existence of asymmetries in basketball. In Europe, relative age differences among young basketball players are present in different categories (Arrieta et al., 2016; Rubia et al., 2020b; Subijana & Lorenzo, 2018; Vegara-Ferri et al., 2019), tending to weaken as the age increases (Torres-Unda et al., 2013; Vegara-Ferri et al., 2019). Specifically, in French basketball, unequal distribution of players has been proved in the whole young licensed (Delorme & Raspaud, 2009), arising the need to consider RA as an important factor to take into account for athletes' career pathway and their chances to successfully reach to the elite level, been proved that as a negative consequence of RA, a higher number of dropout players were born in Q3 and Q4 (Delorme et al., 2011). Asymmetry bias has been observed both in males and females (Arrieta et al., 2016), but it should also be mentioned that this phenomenon has not been clearly proven in all previous research. For example, Werneck et al. (2016) did not observe RA in Olympic basketball athletes nor for sex or continent, except in French athletes or Vegara-Ferri et al. (2019) did not find RA at the Rio 2016 Olympic Games.

Out of Europe, the background is not as consistent, for example, in some studies on American athletes, the RA has not been clearly observed (Côté et al., 2006). In the case of Asia, some studies on soccer have been explored in previous work (Li et al., 2020; Liu & Liu, 2008), however, it has been studied to a much lesser extent in this continent, having only 3,66% of the total RA published articles focusing on Asia (Bilgiç & Işın, 2022) and none to the best of our knowledge focusing on Asian basketball.

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China hosts the Chinese Basketball Association (CBA), which is the main basketball league in that country. The few available results do not allow to prove the existence or the lack of bias in basketball players in China (Werneck et al., 2016). Additionally, the RA prevalence is not equal at all competitive levels. There is more evidence of RA prevalence at the youth level, but not as much at the senior professional level. For these reasons and, due to the scarce data, more background is required to shed light on this bias that remains in sports. This topic is especially interesting in China, where the talent development system it´s very particular due to cultural, sportive, and political reasons (Bonal et al., 2020), for example, the one-child policy has affected the population pyramid. To fill this gap in the literature, this paper aims to examine the birth dates distribution and RA by position in the CBA, the Professional Basketball League of China.

METHODS

Participants were professional players of the Chinese Basketball Association (CBA), Professional Basketball League of China in the 2017/2018 Season, data was collected from the official CBA website (www.cbaleague.com). The average age of the players was 26.98 ± 4.18 years. The Relative Age (RA) was detected through Poisson regression (Doyle & Bottomley, 2018, 2019). Poisson regression formula $y = e (b0 + b1x)$ explains the frequency count of an event (y) by an explanatory variable x. The data used for Poisson regression were the week of birth (WB) whereby the first week in January was designated WB 1, and the time period of birth (tB) describing how far from the beginning of the year a player was born. This last index ranging between 0 and 1 was calculated as $tB = (WB - 0.5)/52$. In the Poisson regression, the event (y) was the frequency of birth in each week and the explanatory variable (x) was tB. We also calculated the index of discrimination (ID) according to Doyle and Bottomley (2019) as e-b1. This index measures the relative odds of a player born on day 1 versus day 365 of the competition year being selected. The likelihood ratio D2 was determined according to Cohen et al. (1996). All statistical tests, including descriptive analysis, were performed using the software package R (version 4.0.2). Significance was set at $p<0.05$.

RESULTS

The birth date distributions by quartile (Q) and semester (Se) for the players of the championship by position are shown in Table 1.

Table 1. Birth date distributions according to their quartile (Q) or semester (Se) of birth.

Position		Q1	Q2	Q3	Q4	Se 1	Se 2
Center	n	17	11	11	12	28	23
	%	33.3	21.6	21.6	23.5	54.9	45.1
Power Forward	n	17	13	10	8	30	18
	%	35.4	27.1	20.8	16.7	62.5	37.5
Forward	n	16	8	6	7	24	13
	%	43.2	21.6	16.2	18.9	64.9	35.1
Small Forward	n	17	11	10	8	28	18
	%	37.0	23.9	21.7	17.4	60.9	39.1
Shooting Guard	n	14	8	8	8	22	12
	%	41.2	23.5	23.5	11.8	64.7	35.3
Point Guard	n	43	28	27	24	71	51
	%	35.2	23.0	22.1	19.7	58.2	41.8
Total (All Players)	n	124	79	72	63	203	135
	%	36.7	23.4	21.3	18.6	60.1	39.9

The participants analyzed show that there is a clear overrepresentation of players in the first months of the year. Considering the semester, the representation of players that were born between January and June is higher in all the positions (center, power forward, forward, small forward, shooting guard, and point guard). In all these positions, the representation of players in the first semester is between 54.9% and 64.9%).

Considering the quartile of birthdays, the percentage of players in the first quartile (born between January and March) is the most common. Also, the representation of players in the four quartiles

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decreases from the first to the fourth quartile, except for the positions of center and forward. In these two field positions, the representation of players in the four quartiles does not decrease linearly, meaning that the fourth quartile (Q4) is not the less represented group.

Similar findings can also be observed in Figure 1. The time to born (t_B) and the frequency of players are shown in the x and y axes. The scatter plot evinces a clearly higher number of players at the beginning of the year.

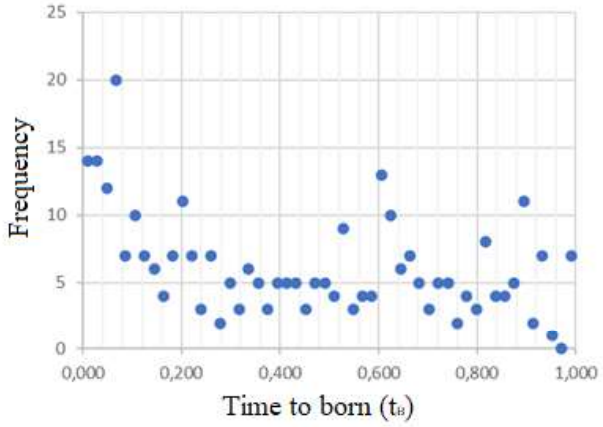

Figure 1. Frequency of week of birth (WB) for all players.

However, this figure does not allow differentiation by position. For that purpose, a second analysis was performed, based on a Poisson regression by frequency. This analysis also revealed the presence of a significant overall RA in Players of the CBA Championship (Table 2), with some differences in some of the positions. Thus, richer results apart from Table 1 and Figure 1 are exhibited.

The data was also explored by position and globally. Analyzed by position, the *p-value* for the Poisson regression reveals that there are no significant differences for centers, power forwards, or small forwards. However, the results are significant for shooting guards and point guards.

Table 2. Poisson regression analysis of RA by frequency for all players and the different field positions.

	Center (n=56)	Power Forward (n=51)	Forward (n=43)	Small Forward (n=58)	Shooting Guard (n=30)	Point Guard (n=102)	Overall (n=318)
W_B	26 ± 16	23 ± 16	23 ± 16	26 ± 16	21 ± 16	20 ± 15	23 ± 16
t_B	0.49 ± 0.30	0.43 ± 0.30	0.43 ± 0.30	0.49 ± 0.30	0.39 ± 0.30	0.38 ± 0.28	0.43 ± 0.31
b_0	0.20	0.26	0.26	024	0.04	1.36	2.26
b_1	-0.29	-1.00	-1.00	-0.30	-1.35	-1.59	-1.01
ID	1.34	2.72	2.72	1.34	3.87	4.92	2.75
R^2 (McFadden)	0.0083	0.06	0.06	0.0073	0.072	0.25	0.24
p-value	0.524	0.060	0.060	0.509	**0.038**	**0.000**	**0.000**

Note: WB: week of birth; tB: time of birth; ID: index of discrimination

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DISCUSSION

It has been demonstrated that in those initial competitive years, the Relative Age can be considered a key factor with a high influence on their overall talent development and it affects the chances of reaching the top basketball elite level (Díaz-Aroca & Arias-Estero, 2022; Esteva et al., 2006; Kalén et al., 2021; Kelly et al., 2021; Maciel et al., 2021; Subijana & Lorenzo, 2018). Elite team player spots are limited, and to be able to occupy such spots represents a great contribution to players´ individual talent development at either club´s competition, national teams' competitions, or special national talent programs (Kalén et al., 2021; Kelly et al., 2021; Maciel et al., 2021; Maciel et al., 2022; Subijana & Lorenzo, 2018). While results on basketball senior players were not always consistent in previous research (Subijana & Lorenzo, 2018; Lupo et al., 2019; Oliveira et al., 2019; Vegara-Ferri et al., 2019; Werneck et al., 2016) it is clear that players who benefit from RA (i.e. born in Q1 and Q2) during their development have a higher presence at the Chinese Basketball League clubs rosters. The same results were founded in the ACB Spanish basketball league, where a predominance of early-born players was founded (Esteva et al., 2006), however, opposite findings were stated when analyzing dates of birth of NBA league players (Esteva et al., 2006). In this line, our results show coherence with other scientific evidence (Werneck et al., 2016), supporting that at a professional senior elite level, the RA is not always evident, and if so, not in all the positions of the game. Thus, our research aligns with this last group: general RA was noted for the league as a whole, but just for guards and shooting guards if divided by positions.

The potential explanation for why RA is commonly present in youth basketball competitions and not at senior could be based on the performance indicators that rule the different categories, since those are very different at junior and senior levels (Sampaio et al., 2004). On one hand, at the junior level, anthropometric and physiological characteristics of the different basketball players have been found decisive aspects of performance (Hoare, 2000; Karalejic et al., 2011), been a potential response to why centers and forwards could be more dominant on those youth categories (Ibáñez et al., 2018; Vegara-Ferri et al. 2019). On the other hand, Sampaio et al. (2004) stated the importance of passes and the low number of lost balls at the senior level. Having good technical skills and being able to read the game properly is fundamental at the senior level, choosing the best tactical option at every moment, quickly and wisely. This fact could relate to the obtained results when analyzing the RA in the CBA Chinese Super League, where point guards and shooting guards show to be beneficiated by significant RA for example, in the case of guards they are traditionally often evaluated for those exact performance indicators: technical skills and ability to read the game and build the team game (Fernández-Cortés et al., 2021).

Specific conclusions related to the different player positions should be considered based on their specific context, as previously explored, since player profiles and performance indicators have been proven different among guards, forwards, and centers (Sampaio et al., 2006). Most of the previous scientific literature which analyses the RA at different positions is focused on the youth categories, but almost none at the senior level. For instance, pointguards, centers, and forwards have been shown to have a wider advantage in comparison to other positions in the U17, U18, and U19 categories (Ibáñez et al., 2018; Vegara-Ferri et al., 2019), been significantly higher in centers at male competitions, and power forwards in female competitions. As opposed to the present investigation results, Saavedra et al. (2015) found RA to be more significant at those positions that required a higher height (i.e. centers) for male competitions, and in contrast, at female competitions, RA was more present for positions that did not require an exuberant height (i.e. guards and shooting guards). That last finding can align with the current investigation, but in this case, when applying it to a male competition context.

In addition, this varies depending on the exact competition that is been examined. For example, the investigation by Sampaio et al. (2006) showed the differences in player roles between the Portuguese LCB League (where centers and point guards have a more defensive role performing a higher number of defensive rebounds and blocks), Spanish ACB League (where they stand out for assist and three points throws), and American NBA (where they are characterized by offensive rebounds). Point guards

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with a higher competitive experience acquire their performance skills faster than other positions, thus high or size is not essential for this position, versus forwards or centers who depend more on these qualities to be successful at the elite level (Ibáñez et al., 2018). This aligns with our results and with previous research that shows RA gradually decreasing for centers and forwards as the age of the players increases (Ibáñez et al., 2018), considering the homogeneity of anthropometric and physical characteristics of players at the senior elite level.

CONCLUSIONS

The Relative Age (RA) remains one of the results of biased selection at different competitive levels. This research's results confirm the existence of RA at the CBA Chinese Basketball Super League since players born in the first months of the years were the ones overrepresented at the CBA teams' rosters compositions, thus reaching the elite level of the talent development pathway. However, it has been observed that there is a statistically significant situation present among point guards and shooting guards. Although previous research has also warned about this unequal distribution of players, this study helps to deepen the knowledge of the Chinese sports system and how different is this situation at professional levels compared to youth levels.

Future analysis could continue exploring sports systems out of the two most explored sports contexts: the American and the European sports leagues. Also, further research could investigate if there are some performance indicators in CBA Chinese Super League players, to better understand the relation between the obtained greater RA for point guards and shooting guards and their sports performance. For practitioners and policymakers, it is something that concerns them, therefore, increasing the knowledge between RA and the different positions could help to bridge this gap along the talent development pathway.

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