

TRABAJO FIN DE GRADO

Proceso de elaboración y publicación de un artículo en una revista de impacto

INTERNATIONAL REVIEW FOR THE SOCIOLOGY
OF SPORT

Relative age effect in lower categories of male
international basketball

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ÍNDICE

JUSTIFICACIÓN Y OBJETIVO	4
MOTIVACIONES PERSONALES.....	4
OBJETIVO DE LA INVESTIGACIÓN.....	4
ORGANIZACIÓN GENERAL DEL TRABAJO	5
PUBLICACIÓN FINAL	6
PROCESO DE ELABORACIÓN Y PUBLICACIÓN	18
REVISIÓN BIBLIOGRÁFICA	18
PRIMER PROCESO DE RECOGIDA DE DATOS	25
PRIMER PROCESO DE TRATAMIENTO DE DATOS.....	28
SEGUNDO PROCESO DE RECOGIDA DE DATOS.....	30
REDACCIÓN DEL ARTÍCULO (PARTE MASCULINA)	31
PROCESO DE ENVÍO.....	41
• 4-Julio-2012: envío del trabajo a la revista “International Review for the Sociology of Sport”:	42
• 27-Julio-2012: Revisión Mayor	56
• 4- Septiembre-2012: respuesta a la revisión mayor:.....	59
• 5-Septiembre-2012: Revisión Menor.....	61
• 6-Septiembre-2012: Respuesta la Revisión Menor:	63
• 6-Septiembre-2012: Aceptación del artículo:	63
• 4-Octubre-2012: Galeradas:.....	63
• 5-Octubre-2012: Respuesta a las Galeradas:	64
• 30-Octubre-2012: Primera publicación online:.....	66

JUSTIFICACIÓN Y OBJETIVO

MOTIVACIONES PERSONALES

La oportunidad de realizar el estudio sobre “El efecto de la edad relativa en las categorías inferiores del baloncesto internacional” surge gracias a Miguel Saavedra, sin el cual no me hubiese embarcado en este proyecto. Así mismo, su gran implicación en el proyecto ha resultado fundamental para que esta investigación este publicada en la revista: *“International Review for the Sociology of Sport”* (factor de impacto: 0,827).

A través de los contenidos vistos en su asignatura tuve la oportunidad de acercarme al mundo de la investigación y darme cuenta de que es un campo que me resulta interesante y atractivo. Además de los contenidos teóricos de la asignatura “Metodología de Investigación en Actividad Física y Deporte”, otro elemento que ha resultado clave para determinar mi interés por el campo de la investigación ha sido la realización de un trabajo para dicha asignatura en el que se analizaba la “Home Advantage” de la liga BBVVA de fútbol tomando como referencia las temporadas comprendidas entre el 2000-2010. Este trabajo me ha permitido conocer más de cerca lo que conlleva realizar un estudio de investigación y ha sido uno de los factores determinantes para que posteriormente decidiese realizar el trabajo de investigación que se desarrolla en este trabajo Fin de Grado.

Siguiendo con el orden secuencial de los motivos de porqué he realizado este trabajo, he de mencionar que el elemento desencadenante se produjo al terminar la asignatura y ver que los resultados en ella habían sido más que satisfactorios. A partir de aquí, mantuve una reunión con Miguel Saavedra y le propuse mi intención de seguir vinculado a su asignatura. Fue entonces, cuando surgió la posibilidad de llevar a cabo el estudio que se expone en este trabajo. Así mismo, mi compañero Gabriel Eiras Oliveira por encontrarse en mi misma situación también recibió la proposición de participar en el proyecto.

OBJETIVO DE LA INVESTIGACIÓN

La elaboración de una investigación sobre “El efecto de la edad relativa en las categorías inferiores del baloncesto internacional” surge con el único objetivo de ser publicado en una revista internacional. Desde las primeras reuniones, se vio la posibilidad de realizar un estudio en este ámbito debido a la escasez de artículos que tratasen este tema desde el punto de vista que nosotros planteamos. Por todo ello, el profesor Miguel Saavedra nos plantea la oportunidad de realizar un trabajo de investigación sobre este tema con el objetivo de ser enviado a una revista internacional. De este modo, conoceríamos el proceso y los requerimientos necesarios en el desarrollo de una investigación que ha de ser aceptada por una revista internacional.

Una vez que el artículo fue aceptado por la revista *“International Review for the Sociology of Sport”* para su publicación, surge la posibilidad de realizar el Trabajo Fin de Grado a partir de esta investigación.

ORGANIZACIÓN GENERAL DEL TRABAJO

Una vez que nos decidimos a llevar a cabo la investigación que aquí se desarrolla, la primera fase consistió en realizar la revisión bibliográfica. Este apartado se elaboró de forma individual (345 horas empleadas), para posteriormente realizar un análisis conjunto entre Gabriel y yo con el objetivo de realizar una reflexión más profunda sobre los diferentes conceptos, métodos y conclusiones de la bibliografía relacionada con la materia de investigación.

Este mismo mecanismo se ha seguido en el proceso de recogida de datos, en el que una vez definidas las variables a analizar, hemos procedido a realizar la transcripción de los datos de manera individual (123 horas empleadas). A partir de aquí, hemos comparado unos datos con otros con el objetivo de evitar errores que posteriormente nos llevasen a una interpretación errónea de los resultados obtenidos.

A partir de este momento y guiados por el profesor Miguel Saavedra, se decidió separar la investigación en dos partes: una que analizase “El efecto de la edad relativa en las categorías inferiores del baloncesto internacional masculino” y otra que se centrase en “El efecto de la edad relativa en las categorías inferiores del baloncesto internacional femenino”. Esta división se hizo con el objetivo de llevar a cabo un análisis más profundo de cada una de las partes. En mi caso, fui el responsable de realizar el artículo sobre “El efecto de la edad relativa en las categorías inferiores del baloncesto internacional masculino”.

Una vez elaborados ambos artículos por separado y tras someterlos a análisis, se ha visto la posibilidad de refundir ambos trabajos en uno sólo, con el fin de elaborar un artículo más completo que incrementase las posibilidades de ser aceptado por la revista “*International Review for the Sociology of Sport*”.

Una vez enviado el artículo a la revista “*International Review for the Sociology of Sport*”, hubo que realizar una serie de revisiones en el trabajo para cumplir con una serie de requisitos necesarios para su publicación.

PUBLICACIÓN FINAL

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Relative age effect in lower categories of international basketball

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Abstract

To be able to value the relative age effect in the male and female World Championships played between 2005 and 2010 in the U17 categories (athletes 17 years or younger), U19 (athletes 19 or younger) and U21 (athletes 21 years or younger) a sample of 954 players has been selected. The variables registered were their dates of birth, the category of the competition, gender, height and official statistics of each player obtained from the International Basketball Federation (FIBA). A clear relative age effect was found (in both male and female categories) fading with age, being higher in the U17 category, slightly less but also significant in the U19, and no significant effect found in U21. This effect persists when the different specific positions were analysed in the male categories, being clearer in the positions that require more physical strength. In female categories the results do not back the existence of the relative age effect. Also, differences were found in height in the male category with regard to the players' year-quarter of birth, but its interpretation is not consistent with the relative age effect. In the female category no differences were found in height. Finally, the performance difference of the players in the male and female categories hardly varies with regard to the year-quarter of birth.

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Introduction

The term Relative Age Effect (RAE) has been used to determine the effect of the influence of the date of birth in the performance of the person. The first studies that investigated this effect were done in the education environment (Armstrong, 1966; Freyman, 1965).

Investigations made in the education area by Russell and Startup (1986) based their study in the relevance of being born at the start or at the end of the academic year, concluding that pupils born at the start had an academic advantage over the rest until 18 years of age, but after this age, the ones born at the end of the year gave better performance.

Grondin et al. (1984) were the first to do a study of the RAE in sport, finding an unequal distribution in the dates of birth in the players in different levels of Canadian ice hockey and volleyball, concluding that many players were born near to the cut date. These studies have been revised, updated and confirmed (Gibbs et al., 2011; Nolan and Howell, 2010).

Musch and Hay (1999) investigated the age effect in an intercultural sample (Germany, Japan, Brazil and Australia) and concluded that the cut date in football is the main factor that effects relative age in professional football.

Other studies that analyzed the RAE in the formation ages of sport groups included the essays by Helsen et al. (1998), whose results indicated that youth football players born between August and October (the first part of the year for the selection) are more probable to be identified as talented and to be exposed to higher levels of training, whilst the players born at the end of the year tended to drop out at 12 years of age. Also, an essay with young footballers by Ashworth and Heyndels (2007) proved that players born after the cut-off date earned higher wages.

There are studies that found that age bias is not only prevalent in the minor leagues but also carries over into the professional leagues. The results of the Helsen et al. (2005) investigation show an excessive representation of players born in the first three months of the year (from January to March) for all youth National Teams in the under 15 years of age (U15), U16, U17 and U18, and the same being true for the UEFA Sub-16 and the Meridian Cup. The players with a relatively older age are more likely to be identified as talents because of the probable physical advantages that they have over the other, younger players. Continuing with football at professional level, Jullien et al. (2008) concluded that coaches tend to select players born in the first four months of the year.

Carling et al. (2009) investigated whether the maturity, the anthropometric profile and the valuation of physical state varied in the distribution of the date of birth in the elite. This study suggested that the relative age of the athlete does not always relate to a significant advantage in physical components.

Delorme and Raspaud (2009) found clear differences in the relative age effect in French athletes aged between seven and 18 years, in both male and female categories. They also studied the height of the players, finding that the ones born in the first two terms of the year were taller. Also, Delorme et al. (2011) investigated the relative age effect as a factor for abandoning sport in basketball players, finding a higher index of

leavers in players born at the end of the year. Nolan and Howell (2010) found that age bias is not only prevalent in the minor leagues but also carries over into the National Hockey League (NHL).

Other studies found that relative age effect is only prevalent in lower categories, diminishing over time and not being present in professional sport. In basketball, the investigation by Esteva et al. (2006) determined a strong tendency to select players born in the first three months of the year compared to those born towards the end of the year. This tendency loses its strength as the players go through the categories, until arriving at professional basketball. This is explained because in the first stages of the sport, the players are selected only because of their advanced maturity or other indicators such as height. This way, a great quantity of possible future talents are lost and other players have more opportunities of getting to become professional players only because they were born in the first three months of the year. Gibbs et al. (2011) found that the relative age effect is moderate for the average Canadian National Hockey League player and reverses when examining the most elite professional players.

Lidor et al. (2010) studied the effects in a small country (Israel) of the relative age and the place of birth of the players in various sports, in which basketball was included. No significant relative age effect or the effect of the place of birth was found.

Baker et al. (2010) revised the possible causes of the RAE and suggested some solutions. The most used explanation for justifying the RAE is the process of maturation of the athletes: the athletes born nearer the cut-off date have higher levels of performance than the younger ones (Barnsley and Thompson, 1988; Malina, 1994; Malina et al., 2004). The solutions suggested tend to be related to the variation of the age, which means that the RAE changes but is persistent (Helsen et al., 2000; Musch and Hay, 1999; Simmons and Paull, 2001). Other solutions suggest an enormous administrative complex, such as the one by Barnsley and Thompson (1988) who say that the selection of participants should adjust to a certain distribution or control of the average age in all types of teams Helsen et al. (1998, 2000).

The objective of this present study is to check whether the relative age effect does exist in the World Basketball Championship U17, U19 and U21 male and female categories, to investigate if the relative age effect exists in the different specific positions and also try to find differences in height and in performance between players depending on their date of birth.

Material and methods

Sample

The athlete populations were selected from the last male and female editions of the Basketball World Championships U17 played in 2010, U19 played in 2011 and U21 played in 2005 in the male category, and in 2007 in the female category. The total number of athletes in the sample is 954, of which 472 are from the male category (143 player in the U17, 191 in U19 and 138 in U21) and 482 from the female category (144 players in the U17, 194 in U19 and 144 in U21).

The International Basketball Amateur Federation (FIBA) defines the international rules of basketball and is responsible for controlling and regulating all international competitions. In the World Championship in the U17, U19 and U21 categories, the participation of the athletes must be that age or younger. The criteria selection used indicates that at least 10 participating athletes are born in the same year. Applying this rule, in the analysis, in the male category a 15-year-old athlete was excluded in the U17, another aged 16 in the U19 and eight athletes in the U21 (seven players were 18 years old and one was 17). In the female category five players aged 15 and two aged 17 were excluded in the U17, seven players aged 16 and two aged 15 in the U19 and four players aged 17 and two aged 16 in the U21.

Procedure

The following variables were studied: gender, category, season, team, classification, position and date of birth. Also the height of the players was registered and the relative variables of the performance of the players (games played; minutes played; converted field goals, tries, and the percentage of effectiveness; two point field goals, tries, and the percentage of effectiveness; three point field goals, tries, and the percentage of effectiveness; free goals scored, tried, and the percentage of effectiveness; defensive rebounds; offensive and total of rebounds; assistances; personal faults; recuperations; stolen; blocked; points; points per game; rebounds per game and game assistance).

The information was collected from the FIBA website (<http://www.fiba.com/>). Afterwards the variable term was generated, dividing the dates of birth of the players into four terms (quarters) that start on the 1st of January and end on the 31st of December of the same year. This way the athletes born from the 1st of January until the 31st of March form the first term (Q1), the players born from the 1st of April until the 30th of June form the second term (Q2), the players born from the 1st of July until the 30th of September belong to the third quarter (Q3) and finally the players born from the 1st of October until the 31st of December make up the fourth term (Q4).

Analysis of information

To determine the RAE, the Chi-squared test was used to determine if the distribution of the dates of birth differ significantly from the theory distribution that is hoped to be found (in which the probability of finding athletes born in whichever term of the year is the same).

To compare between the height of the players and the relative performance variables for each term of birth, an ANOVA was used and the post-hoc analysis used the Tukey range test, a previous guarantee of normality (Kolmogorov–Smirnov test) and an equality (Levene test). In the case that the requirements of application were not met, the use of ANOVA is rejected and the Kruskal–Wallis test is used. In this study the statistic tests are considered significant when $p < 0.05$.

Results

Table 1 shows the term distribution of the birth dates of all players of the basketball world championships in lower categories.

The global distribution observed is different than expected in both male ($\chi^2=52.41$; d.f.=3; $p<0.001$; Figure 1), and female categories ($\chi^2=45.43$; d.f.=3; $p<0.001$; Figure 2).

When analyzing the categories in the U17 competition, the distribution observed is different than the uniform expected in the male ($\chi^2=43.66$; d.f.=3; $p<0.001$) and female categories ($\chi^2=11.28$; d.f.=3; $p<0.011$). The same happened in the U19 category in both the male ($\chi^2=17.65$; d.f.=3; $p<0.001$) and female categories ($\chi^2=22.87$; d.f.=3; $p<0.001$). Finally in the U21 category the distribution observed does not differ from the expected in either male ($\chi^2=4.32$; d.f.=3; $p<0.229$) or female categories ($\chi^2=6.50$; d.f.=3; $p<0.091$).

Table 1. Terms of the date of births of all players in the Basketball World Championships U17, U19 and U21

Gender		Overall		U17		U19		U21	
		Observed	Expected	Observed	Expected	Observed	Expected	Observed	Expected
Males	Q1	176	118	66	35.8	68	47.8	42	34.5
	Q2	126	118	38	35.8	49	47.8	39	34.5
	Q3	102	118	26	35.8	47	47.8	28	34.5
	Q4	68	118	12	35.8	27	47.8	29	34.5
	Total	472		142		191		138	
	χ^2	52.41		43.66		17.65		4.32	
	Sig.	0.000		0.000		0.001		0.229	
Females	Q1	159	120.5	50	36	71	48.5	38	36
	Q2	144	120.5	40	36	57	48.5	47	36
	Q3	102	120.5	31	36	38	48.5	33	36
	Q4	77	120.5	23	36	28	48.5	26	36
	Total	482		144		194		144	
	χ^2	35.43		11.28		22.87		6.50	
	Sig.	0.000		0.010		0.000		0.090	

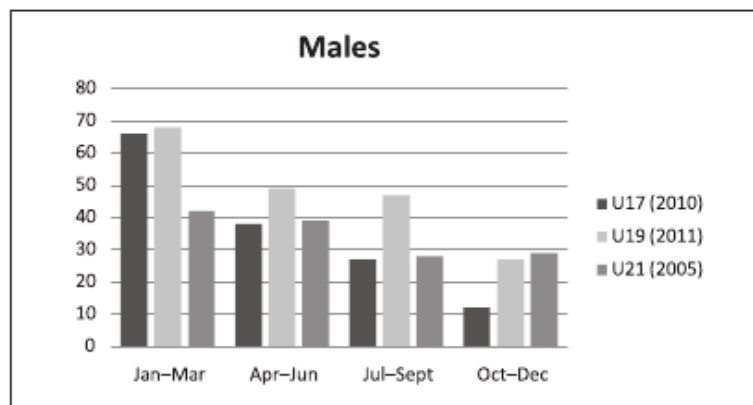


Figure 1. Distribution of the dates of birth in function of age in the male categories.

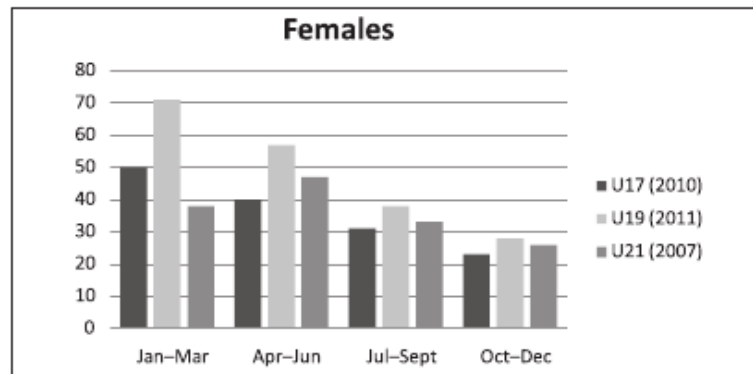


Figure 2. Distribution of the dates of birth in function of age in the female categories.

Specific positions

In the analysis of the specific positions (Table 2) a different distribution was found in the birth terms than the one expected in all of the positions ($p < 0.05$) in the male category, being more distinct in the positions that require higher physical form (centre and power forward). In the female category the distribution in terms are different in the point guard, shooting guard and small forward ($p < 0.05$).

Height of players

When comparing height in the four terms, significant differences were found ($p < 0.008$) in the male category, although no differences were found using the post-hoc analysis between the first and fourth term. Two homogeneous subsets were defined, the first formed by the heights of the first (195 cm), third (195.41 cm) and fourth terms (197.86 cm); the second is formed by the second (198.45 cm) third (195.41 cm) and fourth terms (197.86 cm). In the female categories no significant differences were found.

Performance

Male category. In the U17 category after the application of the Kruskal–Wallis test, significant differences were found ($p < 0.017$) in the percentage of three point field throws, showing better percentages in players born in the first (22.5%) or in the second term (22.8%) of the year than players born in the third (20.0%) and fourth terms (21.4%).

In the U19 category significant differences were found ($p < 0.036$) using the Kruskal–Wallis test in the points obtained per game with values of 6.7% for the first term, 7.3% for the second term, 5.2% for the third term and 6.8% for the last term. In the U21 category no significant differences were found in either of the variables studied.

Table 2. Birth terms of players in the Basketball World Championships in predicting performance in specific positions

Gender		Point-Guard		Shooting-Guard		Small-Forward		Power-Forward		Centre	
		Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.
Males	Q1	21	12.8	24	11.8	22	15.3	19	11.8	20	18
	Q2	6	12.8	7	11.8	18	15.3	12	11.8	27	18
	Q3	18	12.8	10	11.8	14	15.3	11	11.8	15	18
	Q4	6	12.8	6	11.8	7	15.3	5	11.8	10	18
	Total	51		47		61		47		72	
	χ^2	14.65		17.77		8.05		8.40		8.78	
	Significance	0.002		0.000		0.045		0.038		0.032	
Females	Q1	19	10	24	13.5	17	13.3	11	11.5	22	20.3
	Q2	11	10	9	13.5	21	13.3	13	11.5	23	20.3
	Q3	4	10	13	13.5	5	13.3	10	11.5	22	20.3
	Q4	6	10	8	13.5	10	13.3	12	11.5	14	20.3
	Total	40		54		53		46		81	
	χ^2	13.40		11.93		11.53		0.44		2.61	
	Significance	0.004		0.008		0.009		0.933		0.457	

Female category. No significant differences were found in the performance by terms in the U17 category. In the U19 category differences were found in the percentage of field throws ($p < 0.005$) with lower percentages in the first (33.1%) and second terms (34.8%) in relation to the third (41.7%) and fourth terms (39.2%). In the percentage of the two points ($p < 0.005$), the same performance and values were found in all four terms respectively, 35.2%; 36.9%; 46.6% and 41.1%. The assistances ($p < 0.013$) show values of 8.9%, 4.7%, 7.1% and 7.1% for the four terms respectively, showing lower values in the second term. The assistances per game ($p < 0.013$) show values of 1.17%, 0.64%, 0.95% and 0.94% for the four terms, and also show lower values in the second term. Finally, in the U21 category no significant values were found in the performance with regard to the term of birth.

Discussion

In the present study, the existence of the relative age effect has been confirmed in the Basketball World Championships in U17 and U19. In the U21 championship no significant differences were found. The same behaviour was found in the male and female categories. Also, the effects of relative age persist when talking about specific positions, proving to be more distinct in the positions that require more height in the male category. In the female category the effects of the relative age are more significant in the positions that require less height. However, the height of the players does not show expected values if the relative age effect exists. No significant differences were found in the height of the players analysed. Finally, small variations have been found in the performance of the

players with regard to the effect of the term of birth in both male and female categories, although these variations do not coincide with the existence of the relative age effect.

The existence of the relative age effect in basketball has been documented by various authors (Delorme and Raspaud, 2009; Delorme et al., 2010; Esteva et al., 2006) in male categories. Most investigations analyse male sport and few have been done in female categories and even fewer in basketball. Delorme et al. (2010) found a relative age effect in female basketball and Roman and Fuchslocher (2011) found it in football in 2011. These studies, as with the present one, disagree with the ones done by Delorme and Raspaud (2009) who found no relative age effect in female basketball. This effect may have been found in other young athletes in other sport disciplines (Ashworth and Heyndels, 2007; Helsen et al., 1998, 2005).

As in this study, the investigations done in German football by Schorer et al. (2009b) or in handball by Gutiérrez et al. (2012) found a slight fall in the relative age effect as the age of the athletes increases.

Schorer et al. (2009b) documented a relative age effect in different specific positions in German football, proving results that correspond with those obtained in the present study in the male categories, as the positions that require a higher physical form are taken more often by athletes born in the first months of the year. The results found in female categories do not support the idea of the relative age effect as the players born in the first months of the year tend to take base point, shooting guard and small guard positions, which are less dependent on biologic maturity. However, in football, Roman and Fuchslocher (2011) found a stronger relative age effect in goalkeeping and defence positions than in midfield and upfront positions.

In the present study no relative age effect was found in function of height or performance of the players. Schorer et al. (2009a) documented similar results in handball and determined that the cause of RAE is not related to either height, weight or technical abilities, as no differences were found between relatively older and younger players. Neither anthropometric factors nor physical performance in young footballers found a RAE (Carling et al., 2009; Hirose, 2009).

Conclusions

The relative age effect exists and is significant in the Basketball World Championships in both male and female U17 and U19 players. This effect diminishes as the age of the athletes increases, and disappears in U21.

In specific positions the effect of relative age is also significant, being in the male category clearer in the centres, power forwards and small forwards and less in point guards and shooting guards. In the female category the results do not support the existence of the relative age effect.

In the male category, differences were found in the height of the players with regard to the term of birth, although these differences do not coincide with those expected if the relative age effect exists. However, no significant differences were found in height in the female categories.

The performance of the players with regard to the birth term shows minimal differences in the male category in the U17, as the players born in the first two terms obtained

better percentages in the three point field throws than the ones born in the last terms of the year. In the U19, the points obtained are fewer in players that belong to the third term than the rest of the terms. In the female category some differences were found in the U19 but they do not support the existence of the RAE and no differences were found in either U17 or U21.

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References

- Armstrong HG (1966) A comparison of the performance of summer and autumn-born children at eleven and sixteen. *British Journal of Educational Psychology* 36: 72–76.
- Ashworth J and Heyndels B (2007) Selection bias and peer effects in team sports: The effect of age grouping on earnings of German soccer players. *Journal of Sports Economics* 8: 355–377.
- Baker J, Schorer J and Cobley S (2010) Relative age effects: An inevitable consequence of elite sport? *Sportwissenschaft* 40: 26–30.
- Barnsley RH and Thompson AH (1988) Birthdate and success in minor hockey: The key to the NHL. *Canadian Journal of Behavioural Science* 20: 167–176.
- Carling C, le Gall F, Reilly T, et al. (2009) Do anthropometric and fitness characteristics vary according to birth date distribution in elite youth academy soccer players? *Scandinavian Journal of Medicine & Science in Sports* 19(1): 3–9.
- Delorme N and Raspaud M (2009) Is there an influence of relative age on participation in non-physical sports activities? The example of shooting sports. *Journal of Sports Sciences* 27(10): 1035–1042.
- Delorme N, Boiché J and Raspaud M (2010) Relative age and dropout in French male soccer. *Journal of Sport Sciences* 28(7): 717–722.
- Delorme N, Chalabaev A and Raspaud M (2011) Relative age is associated with sport dropout: Evidence from youth categories of French basketball. *Scandinavian Journal of Medicine & Science in Sports* 21(1): 120–128.
- Esteve S, Drobnic F, Puigdellivol J, et al. (2006) Fecha de nacimiento y éxito en el baloncesto profesional. *Medicina de l'esport* 41(149): 25–30.
- FIBA.com (2012) *FIBA Archive*. Available at: <http://archive.fiba.com> (accessed 13 May 2012).
- Freyman R (1965) Further evidence on the effect of date of birth on subsequent school performance. *Educational Research* 8: 58–64.
- Gibbs BG, Jarvis JA and Dufur MJ (2011) The rise of the underdog? The relative age effect reversal among Canadian-born NHL hockey players: A reply to Nolan & Howell. *International Review for the Sociology of Sport*. Epub ahead of print 22 August 2011. DOI: 10.12690211414343.
- Grondin S, Deshaies P and Nault LP (1984) Trimestres de naissance et participation au hockey et au volleyball. *La Revue Québécoise de l'Activité Physique* 2: 97–103.
- Gutiérrez Ó, Saavedra M, Contreras J, et al. (2012) Influencia del año de nacimiento de una jugadora en las posibilidades de ser captada como talento en el balonmano femenino internacional. *Apunts* 108(2): 46–52.
- Helsen WF, Starkes JL and Van Winckel J (1998) The influence of relative age on success and dropout in male soccer players. *American Journal of Human Biology* 10(6): 791–798.
- Helsen WF, Starkes JL and Van Winckel J (2000) Effect of a change in selection year on success in male soccer players. *American Journal of Human Biology* 12: 729–735.

- Helsen WF, Van Winckel JL and Williams AM (2005) The relative age effect in youth soccer across Europe. *Journal of Sports Sciences* 23: 629–636.
- Hirose N (2009) Relationships among birth-month distribution, skeletal age and anthropometric characteristics in adolescent elite soccer players. *Journal of Sports Sciences* 27(11): 1159–1166.
- Jullien H, Turpin A and Carling C (2008) Influence of birth date on the career of French professional soccer players. *Science & Sports* 23: 149–155.
- Lidor R, Côté J, Arnon M, et al. (2010) Relative age and birthplace effects in division 1 players – Do they exist in a small country? *Talent Development and Excellence* 2(2): 181–192.
- Malina RM (1994) Physical growth and biological maturation of young athletes. *Exercise and Sport Sciences Reviews* 22: 389–434.
- Malina RM, Bouchard C and Bar-Or O (2004) *Growth, Maturation, and Physical Activity*. Champaign, IL: Human Kinetics.
- Musch J and Hay R (1999) The relative age effect in soccer: Cross-cultural evidence for a systematic discrimination against children born in late competition year. *Sociology of Sport Journal* 16: 54–64.
- Nolan JE and Howell G (2010) Hockey success and birth date: The relative age effect revisited. *International Review for the Sociology of Sport* 45(4): 507–512.
- Roman M and Fuchslocher J (2011) Influence of the selection level, age and playing position on relative age effects in Swiss Women's Soccer. *Talent Development and Excellence* 3(2): 239–247.
- Russell RJH and Startup MJ (1986) Month of birth and academic achievement. *Personality and Individual Differences* 7(6): 839–846.
- Schorer J, Baker J, Büsch D, et al. (2009a) Relative age, talent identification and youth skill development: Do relatively younger athletes have superior technical skills? *Talent Development and Excellence* 1: 45–56.
- Schorer J, Cobley S, Büsch D, et al. (2009b) Influences of competition level, gender, player nationality, career stage and playing position on relative age effects. *Scandinavian Journal of Medicine & Science in Sports* 19: 720–730.
- Simmons C and Paull GC (2001) Season-of-birth bias in association football. *Journal of Sports Sciences* 8: 677–686.

PROCESO DE ELABORACIÓN Y PUBLICACIÓN

REVISIÓN BIBLIOGRÁFICA

Una vez que el profesor Miguel Saavedra nos planteo la posibilidad de realizar una investigación sobre el efecto de la edad relativa en el baloncesto, comenzamos a realizar la revisión bibliográfica, con el objetivo de adquirir los conocimientos necesarios y conocer el estado actual de la investigación.

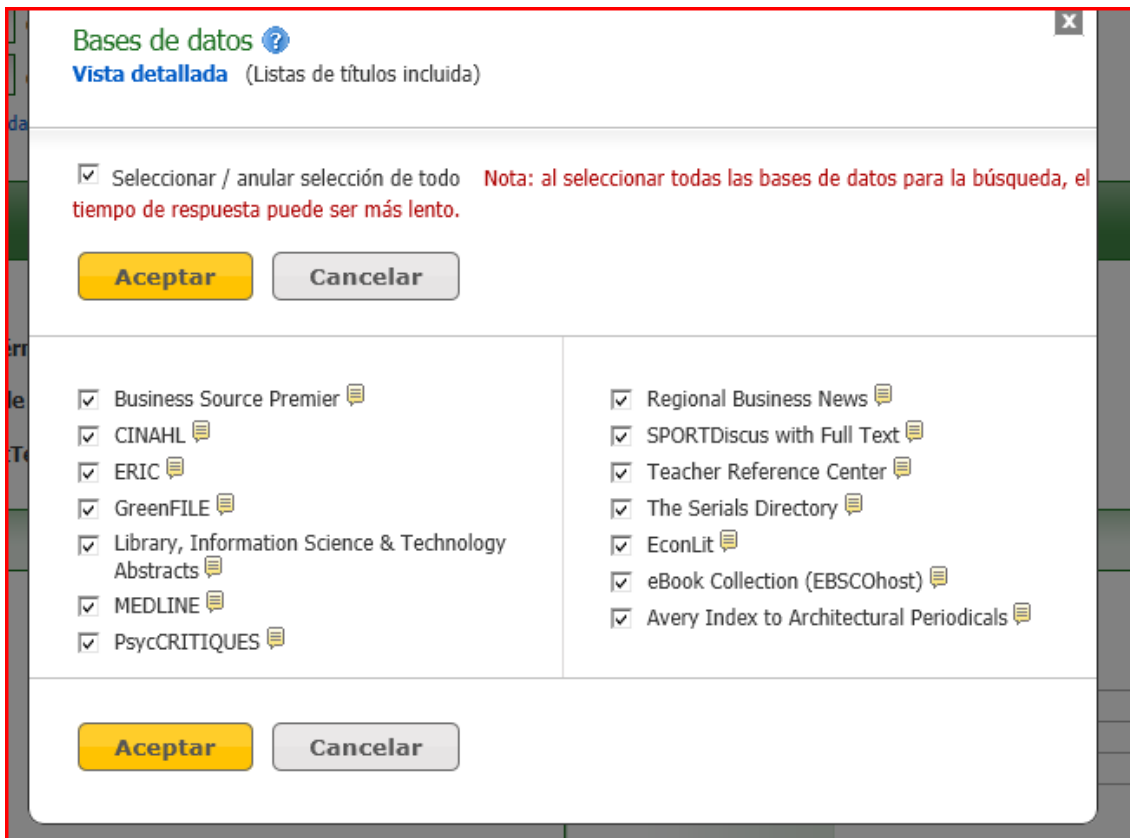
Para llevar a cabo la revisión bibliográfica, recurrimos a la base de datos de la página web de la biblioteca de la UDC.

The screenshot shows the website of the 'Servizo de Biblioteca Universitaria' at the 'UNIVERSIDADE DA CORUÑA'. The page features a navigation menu on the left with categories like 'Biblioteca UDC', 'Servizos', 'Recursos en Internet', and 'Recursos de investigación'. The main content area includes a Google search bar with the text 'formación usuarios universidade da coruña', a 'CATÁLOGOS' section with links to 'Catálogo da UDC', 'REBIUN', and 'Outros catálogos', a 'BIBLIOTECA DIXITAL' section with links to 'Guía da biblioteca dixital', 'Bases de datos', and 'Repositorio institucional UDC (RUC)', and a 'Pórtico' section labeled 'Metabuscador de recursos electrónicos'. At the bottom, there is a 'RefWorks' section labeled 'Xestor de referencias bibliográficas'.

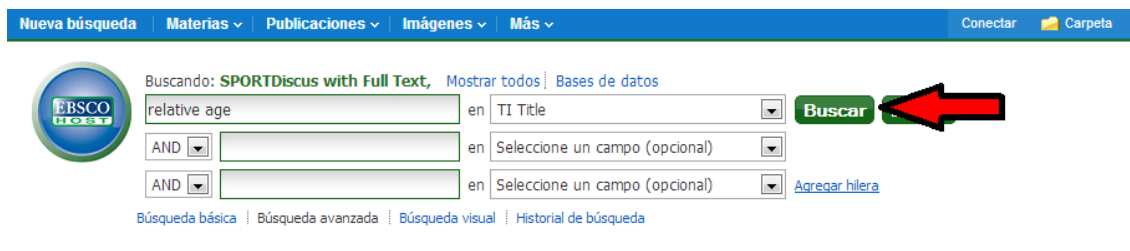
A continuación, recurrimos a la base de datos Sport Discus with Full text, ya que es la específica del deporte:

i	PsycCRITIQUES		T	T
i	Psycinfo			
Q				
i	Quantor Total			
R				
i	Regional Business News		T	
S				
i	SABI: Sistema de Análisis de Balances Ibéricos			
i	SciFinder Scholar web (registro)			
i	SciFinder Scholar web (acceso)			
i	Scopus		T	
i	Social Services Abstracts			
i	Sociological Abstracts			
i	<u>Sport Discus with Full Text</u>		T	
T				
i	Teacher Reference Center		T	
i	Tirant On Line		T	
i	TSD: The Serials Directory		T	
i	TVanuncios			

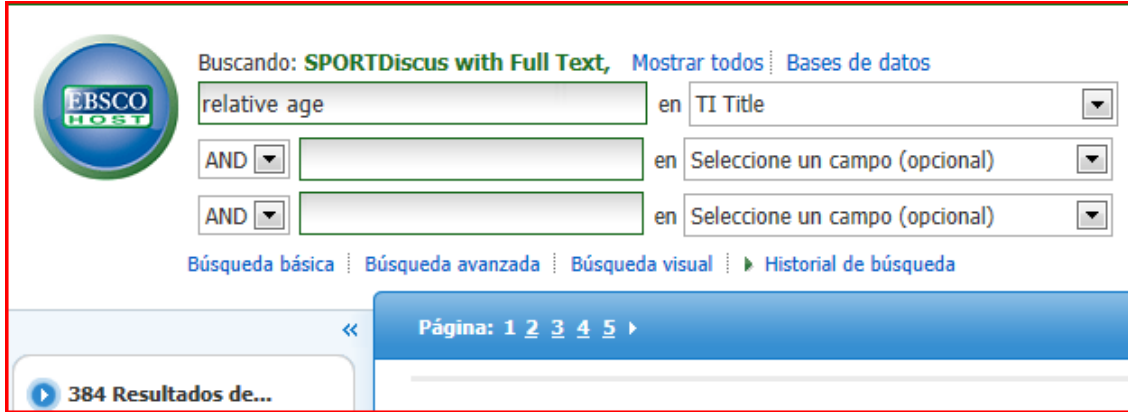
La base de datos Sport Discus with Full Text, está asociada a la editorial EBSCO HOST, por lo que optamos por realizar una búsqueda de todas las bases de datos pertenecientes a esta editorial. De esta manera, nos aseguramos de encontrar los artículos vinculados a nuestra investigación que puedan estar mal ubicados y de otros, que puedan aportar información relevante a pesar de pertenecer a otros ámbitos de estudio.



A continuación, recurrimos a realizar una búsqueda detallada, optando por buscar aquellos artículos en los que su título estuviese asociado al término Relative Age, utilizado como estrategia de búsqueda.



Aplicando los criterios de búsqueda descritos anteriormente, obtuvimos un total de 384 artículos:



Buscando: **SPORTDiscus with Full Text**, Mostrar todos: Bases de datos

relative age en TI Title

AND [] en Seleccione un campo (opcional)

AND [] en Seleccione un campo (opcional)

Búsqueda básica · Búsqueda avanzada · Búsqueda visual · Historial de búsqueda

Página: 1 2 3 4 5

384 Resultados de...

Finalmente, de estos 384 artículos seleccionamos 106, por ser los que contenían el texto completo. En la siguiente tabla, se muestra un resumen de los 73 artículos utilizados que guardan relación con el deporte, indicando las particularidades de cada uno de ellos en lo relativo a la muestra, años de la muestra, método empleado y un apartado de observaciones, en el que indicamos los aspectos que consideramos más relevantes de cada uno de los artículos.







La realización de la revisión bibliográfica, ha sido una labor ardua y extensa. Por un lado, nos hemos encontrado con gran cantidad de artículos relacionados con el término Relative Age, los cuales hemos tenido que analizar uno por uno, para ver que nos podían aportar para la realización del estudio, tanto por el tipo de muestra empleada, como por la definición de términos o por el tipo de análisis de la muestra, y en su caso, eliminar aquellos que careciesen de información relevante. Otro inconveniente, ha sido que todos los artículos seleccionados están escritos en inglés y carecemos de un nivel alto del idioma, por lo que la comprensión y lectura de dichas investigaciones se ha visto dificultada, necesitando de un gran número de horas e incluso de ayuda externa para la correcta comprensión de dichas investigaciones.

El tiempo destinado a la revisión bibliográfica asciende a 345 horas.

PRIMER PROCESO DE RECOGIDA DE DATOS

En primer lugar, comenzamos buscando por internet aquellas páginas que nos pudiesen aportar información para desarrollar el estudio de la edad relativa. Tras comparar diferentes webs, nos decantamos por la página oficial de la federación internacional de baloncesto, ya que esta recogía un amplio abanico de campeonatos y de datos relativos a estos.

Una vez vistos todos los campeonatos que abarca la FIBA (Campeonatos del Mundo, de Europa, de África, de Asia, de Oceanía y América) y sus categorías (U-17; U-19; U-21; U-22; absoluta), decidimos llevar a cabo el proceso de recogida de datos únicamente sobre los campeonatos del mundo. Seleccionando para tal fin los siguientes:

- 1) En categoría masculina:
 - 1.1.1. U21: 2005 (Argentina) y 2001 (Japón)
 - 1.1.2. U19: 2011 (Letonia); 2009 (Nueva Zelanda); 2007 (Serbia); 2003 (Grecia); 1999 (Portugal); 1995 (Grecia); 1991 (Canadá); 1987 (Italia); 1983 (España) y 1979 (Brasil)
 - 1.1.3. U17: 2010 (Alemania)
- 2) En categoría femenina:
 - 1.1.1. U21: 2007 (Rusia); 2003 (Croacia)
 - 1.1.2. U19: 2011 (Chile); 2009 (Tailandia); 2007 (República Eslovaca); 2005 (Túnez); 2001 (República Checa); 1997 (Brasil); 1993 (Corea); 1989 (España); 1985 (Estados Unidos)
 - 1.1.3. U17: 2010 (Francia)

Tras realizar este proceso de selección, pasamos a definir y recoger los datos que consideramos que nos podían ser útiles para llevar a cabo el estudio. En este primer momento, nos decidimos por anotar de cada campeonato las siguientes variables:

- Nombre del campeonato, categoría y género
- Año
- Equipo
- Clasificación del equipo en el campeonato



- Nombre del jugador
- Posición que ocupa en el campo
- Día de nacimiento
- Mes de nacimiento
- Año de nacimiento

En la siguiente tabla se muestra un ejemplo:

4067	worls championship for junior men	1999	PORTUGAL	16	André Manuel RODRIGUES PINTO	F	20	5	1980
4068	worls championship for junior men	1999	PORTUGAL	16	Francisco Gil ALVES FERNANDES	G	22	1	1980
4069	worls championship for junior men	1999	PORTUGAL	16	Paulo CUNHA	F	1	8	1980
4070	worls championship for junior men	1999	PORTUGAL	16	Dinis Miguel CASTRO DE AMORIM		12	3	1980
4071	worls championship for junior men	1999	PORTUGAL	16	Mário Rui CARVALHO GONÇALVES		3	4	1980
4072	worls championship for junior men	1999	PORTUGAL	16	Samba CAMARÁ		6	2	1980
4073	worls championship for junior men	1999	PORTUGAL	16	Pedro Jorge LOURENÇO SANTOS		5	1	1980
4074									

Una vez terminado el proceso, nos dimos cuenta que las variables nombre del campeonato, categoría y género, debían de ir en diferentes celdas, para así poder ser sometidas a un proceso de análisis diferenciado.

	Campeonato	Championship	Category	Gender	Season	Equipo	Classificati	Player_Na	Posicion	Day	Month	Year
1	Fiba U17 World Championshi	World Champio	U17	Male	2010	USA	1	Quinn Co	G	23	3	1993
2	Fiba U17 World Championshi	World Champio	U17	Male	2010	USA	1	Anthony	G	13	4	1993
3	Fiba U17 World Championshi	World Champio	U17	Male	2010	USA	1	Marquis	G	28	2	1993
4	Fiba U17 World Championshi	World Champio	U17	Male	2010	USA	1	Chasson	G	5	2	1993
5	Fiba U17 World Championshi	World Champio	U17	Male	2010	USA	1	Bradley		28	6	1993
6	Fiba U17 World Championshi	World Champio	U17	Male	2010	USA	1	Michael	F	26	9	1993
7	Fiba U17 World Championshi	World Champio	U17	Male	2010	USA	1	Justin A	G/F	19	11	1993
8	Fiba U17 World Championshi	World Champio	U17	Male	2010	USA	1	Adonis T	G/F	25	3	1993

Al ir recopilando los datos, nos encontramos con que en algunos campeonatos y en determinados equipos, las fechas de nacimiento no eran reales, ya que se daban casos en los que los participantes habían nacido más tarde o unos pocos años antes del campeonato e incluso más tarde que la fecha de la competición, como en el caso del jugador de Estados Unidos, Maurice Rayshawn Williams, que tenía por fecha de nacimiento el doce de Diciembre de 1983 y disputaba el campeonato de 1979. Este problema, se daba sobre todo en los campeonatos más antiguos. En este mismo sentido, nos resultó imposible recoger las posiciones de todos los jugadores participantes, ya que en muchos casos no aparecía reflejada. Este inconveniente, además de darse en los campeonatos más antiguos, ocurría en aquellos equipos menos competitivos.

Otro dato que nos resultó llamativo, fue que en algunos equipos aparecían jugadores en los que existía una diferencia de hasta seis años de edad con respecto a sus compañeros.

El tiempo empleado en la transcripción de datos fue de 62 horas, ya que contábamos con un total de 4073 casos y sus respectivas 11 variables. Cada una de las variables debía ser anotada en una celda de excel, siendo imposible hacer un copia-pegar, ya que en la página web de la FIBA la fecha de nacimiento aparecía como una única variable. Además, se realizó un proceso de revisión de los datos para corregir posibles errores en la transcripción, lo que supuso un tiempo de 17 horas. El tiempo total empleado en este trabajo asciende a 79 horas. Por lo tanto, resultó un trabajo laborioso, que requería de cierta concentración para evitar errores a la hora de escribir los datos, viéndose incrementada esta dificultad por la gran cantidad de datos manejados.

Nº casos	Nº variables	Tiempo de transcripción por celda (s)	Tiempo de transcripción total (horas)	Nº casos	Tiempo revisión por caos (s)	Tiempo total revisión (s)	Tiempo total (horas)
4073	11	5	62,23	4073	15	16,97	79.2

Tiempo total transcripción= Nº casos * Nº variables * Tiempo transcripción celda= 62,23 horas

Tiempo total revisión= Nº casos * Nº variables * T. revisión= 16,97 horas

Tiempo total= Tiempo total transcripción + Tiempo total revisión= 79,2 horas

PRIMER PROCESO DE TRATAMIENTO DE DATOS

Una vez finalizado el proceso de recogida de datos, decidimos hacer un filtrado de los mismos para solucionar los problemas con los que nos habíamos encontrado en el apartado anterior.

En primer lugar, se decidió descartar del estudio a aquellos jugadores que no presentaban fechas de nacimiento concordantes a la fecha de realización del campeonato. En este mismo sentido, decidimos descartar aquellas fechas de nacimiento (con sus respectivos jugadores) que no se presentasen más de diez veces a lo largo del

campeonato, por considerar que dicha muestra no es significativa para realizar un estudio, pudiendo dar lugar a futuros errores.

En la siguiente tabla adjuntada, se pueden observar los elementos descartados, en rojo aparecen los relativos a los campeonatos masculinos, y en verde, los pertenecientes a campeonatos femeninos.

Categoría	Año	N	Fechas	Año-Nº deportistas	Categoría	Año	N	Fechas	Año-Nº deportistas
Masculino					Femenino				
U17	2010	144	100%	1993-126; 1994-17; 1995-1	U17	2010	144	100%	1993-102; 1994-35; 1995-5; 1996-2
U19	1979	145	17,2%	1960-12; 1961-6; 1962-3	U19	1985	120	52,5%	1964-2; 1965-12; 1966-19; 1967-9; 1968-5; 1969-4
	1983	166	38,6%	1963-14; 1964-29; 1965-13; 1966-7		1989	144	81,9%	1968-1; 1969-44; 1970-34; 1971-28; 1972-6; 1973-4; 1975-1
	1987	142	88,9%	1967-48; 1968-38; 1969-21; 1970-4		1993	144	83,3%	1973-48; 1974-37; 1975-25; 1976-8; 1977-2
	1991	191	100%	1961-1; 1969-2; 1970-2; 1971-89; 1972-61; 1973-28; 1974-6; 1975-2		1997	140	100%	1977-1; 1978-70; 1979-46; 1980-15; 1981-6; 1982-2
	1995	190	100%	1976-120; 1977-46; 1978-18; 1979-4; 1980-2		2001	144	100%	1982-76; 1983-51; 1984-10; 1985-6; 1986-1
	1999	192	100%	1980-129; 1981-42; 1982-20; 1983-1		2005	145	100%	1986-69; 1987-51; 1988-22; 1989-3
	2003	192	100%	1984-108; 1985-60; 1986-20; 1987-3		2007	190	100%	1988-103; 1989-58; 1990-27; 1991-1; 1992-1
	2007	192	100%	1988-129; 1989-42; 1990-16; 1991-4; 1992-1		2009	189	100%	1990-91; 1991-67; 1992-27; 1993-4
	2009	192	100%	1990-136; 1991-44; 1992-10; 1994-1		2011	196	99%	1992-96; 1993-57; 1994-32; 1995-7; 1996-2
U21	2005	146	100%	1984-66; 1985-41; 1986-30; 1987-7; 1988-1	U21	2003	145	100%	1982-47; 1983-42; 1984-22; 1985-22; 1986-9; 1987-2
	2011	143	100%	1980-72; 1981-43; 1982-24; 1983-2; 1984-1; 1986-1		2007	144	100%	1986-60; 1987-36; 1988-31; 1989-11; 1990-4; 1991-2

Una vez eliminados los datos que consideramos que podían conducir a errores en la elaboración del trabajo, decidimos seleccionar aquellos campeonatos que contenían la información óptima para poder realizar el estudio de la edad relativa.

Los campeonatos seleccionados fueron los siguientes:

	U 21	U19	U17
CAMPEONATOS MASCULINOS	2005 (Argentina)	2011 (Letonia)	2010 (Alemania)
CAMPEONATOS FEMENINOS	2007 (Rusia)	2011 (Chile)	2010 (Francia)

Tras revisar con mayor profundidad la bibliografía existente sobre el efecto de la edad relativa e indagar en la página web de la FIBA, consideramos oportuno incluir las variables relativas a las estadísticas individuales de cada jugador durante el campeonato, ya que nos pareció que estas variables aportaban mayor profundidad al estudio, además de observar que ninguna otra investigación las analizaba, por lo que podría aportar algo novedoso a la bibliografía.

SEGUNDO PROCESO DE RECOGIDA DE DATOS

Para realizar este proceso, recurrimos nuevamente a la página oficial de la FIBA, de la cual obtuvimos los datos estadísticos de cada jugador en el campeonato, así como la altura de los mismos. Este proceso se hizo únicamente con los campeonatos seleccionados en el apartado anterior. Las variables que añadimos fueron las siguientes:

- Altura
- Partidos jugados
- Minutos jugados
- Lanzamientos de campo anotados-lanzamientos de campo intentados y porcentaje de lanzamientos de campo
- Tiros de dos anotados-tiros de dos intentados y porcentaje de tiros de dos.
- Tiros de tres anotados-tiros de tres intentados y porcentaje de tiros de tres.
- Tiros libres anotados-tiros libres intentados y porcentaje de tiros libres
- Rebotes ofensivos-rebotes defensivos y rebotes totales
- Asistencias
- Faltas personales
- recuperaciones
- robos
- bloqueos
- Puntos anotados en el campeonato
- Porcentaje de puntos por partido
- Porcentaje de rebotes por partido
- Porcentaje de asistencias por partido

El tiempo empleado fue de 43,82 horas (35,85 horas de transcripción y 7,97 de revisión), ya que en esta ocasión contábamos con 956 casos y 27 variables nuevas. Al igual que en la recogida de datos anterior, se hizo un proceso de revisión de los datos escritos para evitar posibles errores a la hora de transcribir los mismos.

Nº casos	Nº variables	Tiempo de transcripción por celda (s)	Tiempo de transcripción total (horas)	Nº casos	Tiempo revisión por caos (s)	Tiempo total revisión (s)	Tiempo total (horas)
956	27	5	35,85	956	30	7,97	73,82

Tiempo total transcripción= N° casos * N° variables * Tiempo transcripción celda= 35,85 horas

Tiempo total revisión= N° casos * N° variables * T. revisión= 7,97 horas

Tiempo total= Tiempo total transcripción + Tiempo total revisión= 73,82 horas

REDACCIÓN DEL ARTÍCULO (PARTE MASCULINA)

Una vez recopilados y seleccionados los datos, hemos decidido separar el trabajo en dos partes:

- Efecto de la edad relativa en las categorías inferiores del baloncesto internacional masculino
- Efecto de la edad relativa en las categorías inferiores del baloncesto internacional femenino.

Esta división del trabajo, se ha hecho con el fin de realizar un análisis lo más exhaustivo posible de los datos disponibles en cada uno de los géneros, pudiendo de esta manera elaborar un trabajo más preciso y completo.

En mi caso, he sido el encargado de llevar a cabo el estudio del “Efecto de la edad relativa en las categorías inferiores del baloncesto internacional masculino”.

EFFECTO DE LA EDAD RELATIVA EN LAS CATEGORÍAS INFERIORES DEL BALONCESTO INTERNACIONAL MASCULINO

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Palabras clave

Efecto de la edad relativa, baloncesto, análisis del rendimiento

Resumen

Para valorar el efecto de la edad relativa en los Campeonatos del Mundo masculinos disputados entre 2005 y 2010 en categorías U17 (deportistas de 17 o menos años), U19 (deportistas de 19 o menos años) y U21 (deportistas de 21 o menos años) se ha seleccionado una muestra compuesta por 472 jugadores. Las variables registradas fueron la fecha nacimiento, la categoría de la competición, el género, la altura y las

estadísticas oficiales de cada jugador ofrecidas por la International Basketball Federation (FIBA).

Se ha encontrado un claro efecto de la edad relativa en categorías masculina que disminuye con la edad, siendo máximo en la categoría U17, algo menor, aunque significativo en U19, para, finalmente no encontrar un efecto significativo en U21. Este efecto persiste cuando se analizan los distintos puestos específicos en categorías masculinas, siendo más claro en las posiciones que requieren mayor fortaleza física.

También existen diferencias en la altura en categoría masculina en función del trimestre, pero su interpretación no es coherente con el efecto de la edad relativa. Finalmente, las diferencias en el rendimiento de los jugadores apenas varía en función del trimestre de nacimiento de los jugadores, se encuentran mínimas diferencias en U17 y U19, pero no se han encontrado diferencias en U21.

Introducción

El término Relative Age Effect (RAE) ha sido utilizado para determinar el efecto de la influencia de la fecha de nacimiento en el rendimiento de las personas. Los primeros trabajos que investigan sobre dicho efecto han sido realizados en el ámbito de la educación (Armstrong, 1966; Freyman, 1965)

Investigaciones realizadas en el ámbito de la educación, como la de Russell, y Startup (1986), se centraron en la relevancia de nacer a principio o a final del año académico, concluyendo que los alumnos nacidos a principio de año tienen ventaja académica sobre el resto hasta los 18 años, pero una vez llegados a esta edad, los nacidos a finales de año dan su mejor rendimiento.

Así, Grondin, Deshaies, y Nault (1984) fueron los primeros en realizar estudios sobre la RAE en el deporte, encontrando una distribución desigual en las fechas de nacimiento de los jugadores en distintos niveles del hockey hielo y el voleibol canadiense, concluyendo que había muchos más jugadores nacidos próximos a la fecha de corte. Estos estudios han sido revisados y actualizados y corroborados (Nolan, y Howell, 2010; Gibbs, Jarvis, y Dufur, 2011).

Musch, y Hay (1999) investigaron sobre el efecto de la edad relativa en una muestra intercultural (Alemania, Japón, Brasil y Australia) y concluyeron que la fecha de corte en el fútbol es la principal causa para el efecto de la edad relativa en el fútbol profesional.

Hay otros trabajos que analizan la RAE en los grupos de deportistas en edades de formación, como son los trabajos de Helsen, Starkes, y Van Winckel (1998), cuyos resultados indicaron que los jugadores de fútbol juveniles nacidos entre agosto y octubre (la primera parte del año de selección) tienen más probabilidades de ser identificados como talentosos y estar expuestos a niveles más altos de entrenamiento, mientras que los jugadores nacidos a finales del año tienden a la deserción a los 12 años de edad. También con futbolistas jóvenes está el trabajo de Ashworth, y Heyndels (2007), los cuales encuentran que los jugadores nacidos con posterioridad a la fecha de corte cobran sueldos más elevados.

Los resultados de la investigación de Helsen, Van Winckel, y Williams (2005) muestran una excesiva representación de jugadores nacidos en el primer trimestre del año (de enero a marzo) para todas las selecciones nacionales jóvenes en los menores de 15 años (U-15), U 16, U 17 y U 18, así como para los torneos de la UEFA Sub-16 y la Copa Meridian. Los jugadores con una edad relativamente mayor tienen más probabilidades de ser identificados como talentos, debido a las probables ventajas físicas que tienen sobre los demás. En la misma línea Barnsley, Thompson, y Legault (1992) encuentran un efecto de la edad relativa en campeonatos de mundo de fútbol U17 y U20.

Siguiendo con el fútbol, dentro del ámbito profesional, Jullien, Turpin, y Carling (2008) concluyeron que los entrenadores tienden a seleccionar los deportistas nacidos dentro del primer cuatrimestre del año.

Carling, le Gall, Reilly, y Williams (2009) investigaron si la madurez, los perfiles antropométricos y la valoración del estado físico varían de acuerdo a la distribución de la fecha de nacimiento en la élite. Este estudio concluyó sugiriendo que la edad relativa del deportista no siempre puede estar relacionada con una ventaja significativa en los componentes físicos.

En baloncesto la investigación realizada por Esteva, Drobnic, Puigdellivol, Serratos, y Chamorro (2006) determinó que hay una fuerte tendencia a la selección de los deportistas nacidos en los primeros trimestres del año frente a los nacidos en los últimos. Esta tendencia se mantiene pero pierde fuerza a medida que se sube de categorías, hasta llegar al baloncesto profesional. Este hecho se explica por qué en las primeras etapas de este deporte los deportistas se seleccionan sólo por su maduración avanzada o por uno de sus indicadores: la talla. De esta forma, una gran cantidad de posibles futuros talentos tiende a perderse y otros deportistas tienen más opciones de

llegar a la élite o al deporte profesional sólo por haber nacido en el primer trimestre del año.

Por su parte Delmore, y Raspaud (2009) encontraron un claro efecto de la edad relativa en deportistas franceses desde los 7 a los 18 años, tanto en categorías masculinas como en las femeninas. Además estudiaron la altura de los jugadores, encontrando que los nacidos en los dos primeros trimestres del año son los más altos. También Delmore, Chalabaev, y Raspaud (2010) investigaron el efecto de la edad relativa como un factor para el abandono de la práctica deportiva en jugadores de baloncesto encontrando un mayor índice de abandono en los jugadores nacidos hacia el final del año.

Lidor, Côte, Arnon, Zeev, y Cohen-Maoz (2010) estudian los efectos en un país pequeño (Israel) de la edad relativa y del lugar de nacimiento en jugadores de varios deportes, entre los que se incluye el baloncesto. No encuentran un efecto de la edad relativa significativo ni tampoco un efecto debido al lugar de nacimiento.

Baker, Schorer, y Cogley (2010) hacen un repaso de las posibles causas de la RAE y proponen algunas soluciones. La explicación más utilizada para justificar la RAE es el proceso de maduración de los deportistas, según la cual los que nacen más cerca de la fecha de corte tienen unos mayores valores de rendimiento que los más jóvenes (Barnsley, y Thompson, 1988; Malina, 1994; Malina, Bouchard, y Bar-Or, 2004). Las soluciones propuestas suelen estar ligadas a la variación de la edad de corte, lo que supone que la RAE es modificada, pero esta persiste (Helsen, Starkes, y Van Winckel, 2000; Musch, y Hay, 1999; Simmons, y Paull, 2001). Otras soluciones suponen una enorme complejidad administrativa, como la propuesta por Barnsley, y Thompson (1988) de que las selecciones de participantes deban ajustarse a una determinada distribución, o mediante el control de la edad media de todo un equipo, tal y como exponen Helsen *et al.* (1998; 2000).

El objetivo del presente estudio es comprobar si existe el efecto de la edad relativa en los campeonatos del mundo U17, U19 y U21 de baloncesto en categoría masculina. Conocer si existe el efecto de la edad relativa en los diferentes puestos específicos. También se intenta encontrar diferencias en la altura de los jugadores o de rendimiento en función de la fecha de nacimiento.

Material y métodos

Muestra

Se han seleccionado los deportistas participantes en las últimas ediciones masculinas de los campeonatos del mundo de baloncesto: U17 jugado en el 2010, U19 jugado en el 2011 y U21 jugado en el 2005. El total de jugadores de la muestra es de 472 (143 en U17, 191 en U19 y 138 en U21)

La “Federación Internacional del Baloncesto Amateur” (FIBA) es una organización reconocida como la única autoridad competente en baloncesto por el Comité Olímpico Internacional (COI), formada por 213 Federaciones Nacionales de este deporte. Este organismo es el encargado, entre otras tareas, de controlar y regular todas las competiciones internacionales. En los mundiales U17, U19 y U21 se permite la participación de deportistas de la edad límite o de menor edad. Por ello se ha utilizado como criterio de selección que al menos participen diez deportistas de un mismo año para que este sea considerado. Mediante este procedimiento se ha excluido del análisis, a un deportista de 15 años en el campeonato U17, a otro de 16 años en el campeonato U19 y a ocho jugadores del campeonato U21 (siete jugadores de 18 años y uno de 17 años).

Procedimiento

Se han recogido las siguientes variables: Género, categoría, temporada, equipo, clasificación, posición y fecha de nacimiento.

Además se ha registrado la altura de los jugadores y las variables relativas al rendimiento de los jugadores (partidos jugados, minutos jugados, lanzamientos de campo convertidos, intentados, y el porcentaje de efectividad, lanzamientos de dos puntos convertidos, intentados, y el porcentaje de efectividad, lanzamientos de tres puntos convertidos, intentados, y el porcentaje de efectividad, tiros libres convertidos, intentados, y el porcentaje de efectividad, rebotes defensivos, ofensivos y total de rebotes, asistencias, faltas personales, recuperaciones, robos, bloqueos, puntos, puntos por partido, rebotes por partido y asistencias por partido).

Los datos han sido recogidos de la página web de la FIBA (<http://www.fiba.com/>).

Posteriormente se ha generado la variable trimestre, que divide las fechas de nacimiento de los jugadores en cuatro trimestres (cuartos) y comienzan a partir del 1 de enero del año de nacimiento para terminar el 31 de diciembre de ese mismo año. Así los deportistas nacidos del 1 de enero al 31 de marzo configuran el primer trimestre (Q1),

los nacidos de el 1 de abril al 30 de junio pertenecen al segundo trimestre (Q2), los nacidos del 1 de julio al 30 de septiembre pertenecen al tercer trimestre (Q3) y, finalmente, los nacidos del 1 de octubre al 31 de diciembre configuran el cuarto trimestre (Q4).

Análisis de datos

Para determinar el efecto de la edad relativa (RAE) se utilizó la prueba de Chi-cuadrado para determinar si la distribución de las fechas de nacimiento difiere significativamente de la distribución teórica que espera encontrar (en la que la probabilidad de encontrar deportistas nacidos en cualquier trimestre del año es la misma).

Para realizar las comparaciones entre las alturas de los jugadores y de las variables relativas al rendimiento por cuatrimestre de nacimiento se utilizó el ANOVA de una vía y el análisis post-hoc con Tuckey, previa garantía de normalidad (prueba de Kolmogorov-Smirnov) y de igualdad de varianzas (Prueba de Levene). En caso de que no se cumplieran los requisitos de aplicación se desestima el uso del ANOVA y ha realizado la prueba de Kruskal-Wallis.

En este estudio los test estadísticos se consideran significativos cuando $p < 0,05$.

Resultados

La tabla 1 muestra la distribución trimestral de los nacimientos de los jugadores del campeonato del mundo de baloncesto en categorías inferiores.

De forma global la distribución observada es distinta de la esperada ($\chi^2=52,41$; g.l.=3; $p < 0,001$; Figura 1)

Tabla 1.- Trimestre de nacimiento de los jugadores del Campeonato del Mundo de Baloncesto U17, U19 y U21.

Gender		Overall		U17		U19		U21	
		Observed	Expected	Observed	Expected	Observed	Expected	Observed	Expected
Males	Q1	176	118	66	35,8	68	47,8	42	34,5
	Q2	126	118	38	35,8	49	47,8	39	34,5
	Q3	102	118	26	35,8	47	47,8	28	34,5
	Q4	68	118	12	35,8	27	47,8	29	34,5
	Total	472		143		191		138	
	χ^2	52,41		43,66		17,65		4,32	
	Sig.	0,000		0,000		0,001		0,229	

En el análisis por categorías, se encontró que en la competición U17 la distribución observada es diferente de la esperada ($\chi^2=43,66$; g.l.=3; $p < 0,001$). Lo mismo ocurre en la categoría U19 ($\chi^2=17,65$; g.l.=3; $p < 0,001$). Finalmente en categoría U21 la distribución observada no difiere de forma estadísticamente significativa de la esperada ($\chi^2=4,32$; g.l.=3; $p < 0,229$).

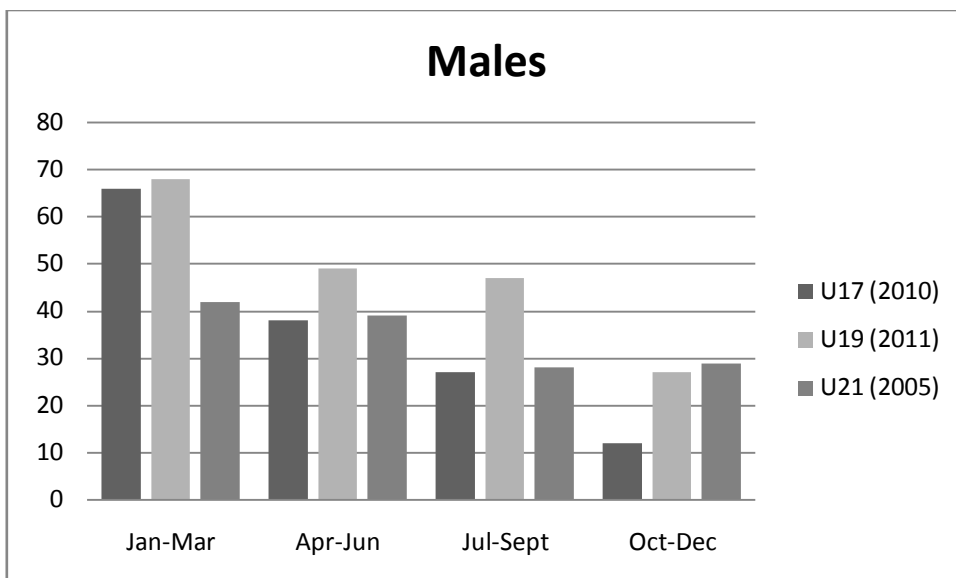


Figura 1.- Distribución de las fechas de nacimiento en función de la edad en categorías masculinas.

Puestos específicos

En el análisis por puestos específicos (tabla 2) se encontró que la distribución observada de los trimestres de nacimiento es diferente de la esperada uniforme en todos los puestos específicos, ($p < 0,05$) siendo más marcada las posiciones en las que los requerimientos físicos son más elevados (pivot y ala pivot).

Tabla 2.- Trimestre de nacimiento de los jugadores del C.M. de Baloncesto en función del puesto específico.

Gender		Base		Escolta		Alero		Ala-Pivot		Pivot	
		Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.
Males	Q1	21	12,8	24	11,8	22	15,3	19	11,8	20	18
	Q2	6	12,8	7	11,8	18	15,3	12	11,8	27	18
	Q3	18	12,8	10	11,8	14	15,3	11	11,8	15	18
	Q4	6	12,8	6	11,8	7	15,3	5	11,8	10	18
	Total	51		47		61		47		72	
	χ^2	14,65		17,77		8,05		8,40		8,78	
Significación	0,002		0,000		0,045		0,038		0,032		

Altura de los jugadores

En la comparación entre los cuatro trimestres de las alturas se encontraron diferencias significativas ($p < 0,008$), si bien no se encontraron diferencias mediante el análisis post-hoc entre el primer y el cuarto trimestre, si se definieron dos subconjuntos homogéneos, el primero formado por las estaturas de los trimestres primero (195cm), tercero (195,41cm) y cuarto (197,86cm); el segundo está formado por los trimestres segundo (198,45cm), tercero (195,41cm) y cuarto (197,86cm).

Rendimiento

En la categoría U17 tras la aplicación de la prueba de Kruskal-Wallis se encontraron diferencias significativas ($p < 0,017$) en el porcentaje de tiros de tres puntos, presentando mejor porcentaje los jugadores nacidos en el primer (22,5%) o en el segundo trimestre (22,8%) del año frente a los nacidos en el tercer (20,0%) y cuarto trimestre (21,4%).

En la categoría U19 se encuentran diferencias significativas ($p < 0,036$) mediante la prueba de Kruskal-Wallis en los puntos obtenidos por partido con valores de 6,7% para el primer trimestre, 7,3% para el segundo trimestre, 5,2% para el tercer trimestre y 6,8% para el último trimestre.

En la categoría U21 no se han encontrado diferencias significativas en ninguna de las variables estudiadas.

Discusión

En el presente estudio se ha confirmado la existencia del efecto de la edad relativa en los Campeonatos del Mundo de Baloncesto U17 y U19. En el Campeonato U21 no se encontró dicho efecto como significativo. Además, los efectos de la edad relativa persisten cuando se habla de puestos específicos, siendo más marcados en aquellos puestos que exigen una mayor talla. Finalmente se han encontrado pequeñas variaciones en el rendimiento de los jugadores en función del trimestre de nacimiento en categoría masculina, sin embargo estas variaciones no son acordes con la existencia de un efecto de la edad relativa.

Al igual que en el presente estudio, las investigaciones realizadas en el fútbol alemán por Schorer, Cobleby, Büsch, Bräutigam, y Baker, (2009b) o en el balonmano (Gutiérrez, Saavedra, Contreras, y Fernández, (2012) encuentran una disminución del efecto de la edad relativa a medida que se incrementa la edad de los jugadores.

Schorer *et al.* (2009b) documentan un efecto de la edad relativa en los distintos puestos específicos en el fútbol alemán, siendo estos resultados acordes con los obtenidos en el presente estudio, ya que las posiciones con mayores requerimientos físicos son ocupadas preferentemente por los deportistas nacidos en los primeros meses del año.

En el presente estudio no se encontró un efecto de la edad relativa en relación a la altura, o en el rendimiento de los jugadores. De la misma manera Schorer *et al.* (2009a), documentan resultados similares en balonmano, que determinan que las causas de la

RAE, no están relacionadas con la altura o peso ni con las habilidades técnicas, ya que no encontraron diferencias entre los jugadores relativamente mayores con los jugadores relativamente jóvenes. Tampoco se encuentra un efecto RAE en los factores antropométricos ni de rendimiento físico en futbolistas jóvenes (Carling, Gall, Reilly, y Williams, 2009; Hirose, 2009).

Conclusiones

El efecto de la edad relativa existe y es significativo en los campeonatos del mundo U17 y U19. Este efecto se reduce al incrementarse la edad de los deportistas y desaparece en U21.

Por puestos específicos el efecto de la edad relativa también es significativo, siendo más claro en los pivots, ala-pivots y alas y menos marcado en bases y escoltas.

Existen diferencias en la estatura de los jugadores en función del trimestre de nacimiento, si bien tales diferencias no concuerdan con las esperadas si existiese un efecto de la edad relativa.

El rendimiento de los jugadores en función del trimestre de nacimiento presenta diferencias mínimas, así encontramos que en U17 los jugadores nacidos en los dos primeros trimestres obtienen mejores porcentajes en lanzamientos de tres puntos que los nacidos en los trimestres finales del año. En U19 los puntos obtenidos por partido son menores en los jugadores del tercer trimestre que en el resto de los trimestres. Finalmente en U21 no se encontraron diferencias en el rendimiento de los jugadores.

Bibliografía

- Armstrong, H. G. (1966). A comparison of the performance of summer and autumn-born children at eleven and sixteen. *British Journal of Educational Psychology*, 36, 72–76.
- Ashworth, J., & Heyndels, B. (2007). Selection bias and peer effects in team sports: The effect of age grouping on earnings of German soccer players. *Journal of Sports Economics*, 8, 355–377.
- Baker, J; Schorer, J., & Cogley, S. (2010). Relative age effects. An inevitable consequence of elite sport? *Sportwissenschaft*, 40, 26-30.

- Barnsley, R. H., & Thompson, A. H. (1988). Birthdate and success in minor hockey: the key to the NHL. *Canadian Journal of Behavioural Science*, *20*, 167–176.
- Barnsley, R. H., Thompson, A. H., & Legault, P. (1992). Family Planning: Football Style. The Relative Age Effect in Football. *International Review for the Sociology of Sport*, *27*, 77-86.
- Carling, C.; le Gall, F.; Reilly, T., & Williams, A. M. (2009). Do anthropometric and fitness characteristics vary according to birth date distribution in elite youth academy soccer players? *Scandinavian Journal of Medicine & Science in Sports*, *19*(1), 3-9.
- Delorme, N., & Raspaud, M. (2009). Is there an influence of relative age on participation in non-physical sports activities? The example of shooting sports. *Journal of Sports Sciences*, *27*(10), 1035-1042.
- Delmore, N.; Chabalev, A., & Raspaud, M. (2010). Relative age is associated with sport dropout: evidence from youth categories of French basketball. *Scandinavian Journal of Medicine & Science in Sports*, *21*(1), 120-128.
- Esteva, S.; Drobnic, F.; Puigdemívol, J.; Serratosa, L., & Chamorro, M. (2006). Fecha de nacimiento y éxito en el baloncesto profesional. *Medicina de l'esport*, *41*(149).
- Freyman, R. (1965). Further evidence on the effect of date of birth on subsequent school performance. *Educational Research*, *8*, 58–64.
- Gibbs, B. G.; Jarvis, J. A.; & Dufur, M. J. (2011). The rise of the underdog? The relative age effect reversal among Canadian-born NHL hockey players: A reply to Nolan and Howell. *International Review for the Sociology of Sport*, *1012690211414343*, first published on August 22, 2011.
- Gronin, S.; Deshaies, P., & Nault, L. P. (1984). Trimestres de naissance et participation au hockey et au volleyball. *La Revue Québécoise de l'Activité Physique*, *2*, 97–103.
- Gutiérrez, Ó.; Saavedra, M.; Contreras, J., & Fernández, J. J. (2012). Influence of Year of Birth of a Player on the Chances of Being Talent Spotted in International Women's Handball. *Apunts*, *108*(2), 46-52.
- Helsen, W. F.; Starkes, J. L., & Van Winckel, J. (1998). The influence of relative age on success and dropout in male soccer players. *American Journal of Human Biology*, *10*(6), 791-798.
- Helsen, W. F.; Starkes, J. L., & Van Winckel, J. (2000). Effect of a change in selection year on success in male soccer players. *American Journal of Human Biology*, *12*, 729–735.

- Helsen, W. F.; Van Winckel, J. L., & Williams, A. M. (2005). The relative age effect in youth soccer across Europe. *Journal of Sports Sciences*, 23, 629–636.
- Jullien, H.; Turpin, A., & Carling, C. (2008). Influence of birth date on the career of French professional soccer players. *Science & Sports*, 23, 149-155.
- Lidor, R.; Côte, J.; Arnon, M.; Zeev A., & Cohen-Maoz, S. (2010). Relative Age and Birthplace Effects in Division 1 Players – Do They Exist in a Small Country? *Talent Development and Excellence*, 2(2), 181-192.
- Malina, R. M. (1994). Physical growth and biological maturation of young athletes. *Exercise and Sport Sciences Reviews*, 22, 389–434.
- Malina, R. M.; Bouchard, C., & Bar-Or, O. (2004). *Growth, maturation, and physical activity*. Champaign Illinois: Human Kinetics.
- Musch, J., & Hay, R. (1999). The relative age effect in soccer: Cross-cultural evidence for a systematic discrimination against children born in late competition year. *Sociology of Sport*, 16, 54–64.
- Nolan JE and Howell G (2010) Hockey success and birth date: The relative age effect revisited. *International Review for the Sociology of Sport* 45(4): 507–512.
- Russell, R. J. H., & Startup, M. J. (1986). Month of birth and academic achievement. *Personality and Individual Differences*, 7(6), 839-846.
- Schorer, J.; Baker, J.; Büsch, D.; Wilhelm, A., & Pabst, J. (2009a). Relative age, talent identification and youth skill development: Do relatively younger athletes have superior technical skills? *Talent Development and Excellence*, 1, 45–56.
- Schorer, J.; Cobley, S.; Büsch, D.; Bräutigam, H., & Baker, J. (2009b). Influences of competition level, gender, player nationality, career stage and playing position on relative age effects. *Scandinavian Journal of Medicine & Science in Sports*, 19, 720–730.
- Simmons, C., & Paull, G. C. (2001). Season-of-birth bias in association football. *Journal of Sports Sciences*, 8, 677–686.

PROCESO DE ENVÍO

Una vez elaborados ambos artículos por separado y tras someterlos a análisis, se ha visto la posibilidad de refundir ambos trabajos en uno sólo, con el fin de elaborar un artículo más completo, que permitiese comparar ambos géneros y llegar a conclusiones más relevantes. Así mismo, esta unificación fue llevada a cabo por considerarse que la

comparación entre ambos trabajos permite conocer un poco más las diferencias que existen entre el baloncesto femenino y masculino. Por todo ello, vimos la posibilidad de que uniendo ambos trabajos en uno solo, se incrementaban las posibilidades de que este fuese valorado satisfactoriamente por alguna revista de prestigio internacional y de esta manera saliese publicado.

En los siguientes apartados, se va a ir contando los procesos por los que paso el artículo desde su primer envío a la revista “*International Review for the Sociology of Sport*”, hasta su final aceptación para ser publicado. Para ello, se van a ir recogiendo los procesos a partir de las fechas en las que fueron llevados a cabo.

4-Julio-2012: envío del trabajo a la revista “International Review for the Sociology of Sport”:

Una vez redactado el artículo, se procedió a su envío a la editorial “*International Review for the Sociology of Sport*”, a través del mecanismo Scholar One .

A continuación se adjunta el artículo enviado:

RELATIVE AGE EFFECT IN LOWER CATEGORIES OF INTERNATIONAL BASKETBALL

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Key words

Relative age effect, basketball, performance analysis

Abstract

To be able to value the relative age effect in the male and female World Championships played between 2005 and 2010 in the U17 categories (athletes 17 years or younger), U19 (athletes 19 or younger) and U21 (athletes 21 years or younger) a sample of 954 players has been selected. The variables registered were their dates of birth, the category

of the competition, gender, height and official statistics of each player obtained from the International Basketball Federation (FIBA).

A clear relative age effect was found (in both male and female categories) which lowers with age, being higher in the U17 category, slightly less but also significant in the U19, and no significant effect found in U21. This effect persists when the different specific positions were analyzed in the male categories, being clearer in the positions that require more physical strength. In female categories the results don't back the existence of the relative age effect.

Also differences were found in height in the male category in function of three months, but its interpretation isn't consistent with the relative age effect. In the female category no differences were found in height. Finally, the differences in the performance of the players in the male categories hardly varies in function of the three months that the players were born in, minimal differences were found in the U17 and U19 categories (they do not support the existence of RAE) and no differences were found in the U17 and U21 categories.

Introduction

The term Relative Age Effect (RAE) has been used to determine the effect of the influence of the date of birth in the performance of the person. The first studies that investigated this effect were done in the education environment (Armstrong, 1966; Freyman, 1965).

Investigations made in the education area, by Russell, and Startup (1986) based their study in the relevance if being born at the start or at the end of the academic year, concluding that pupils born at the start had an academic advantage over the rest until 18 years of age, but after this age, the ones born at the end of the year gave better performance.

Grondin, Deshaies and Nault (1984) were the first to do a study of the RAE in sport, finding an unequal distribution in the dates of birth in the players in different levels of Canadian ice hockey and volleyball, concluding that many players were born near to the

cut date. These studies have been revised, updated and confirmed (Nolan, & Howell, 2010; Gibbs, Jarvis, & Dufur, 2011).

Musch, and Hay (1999) investigated the age effect in an intercultural sample (Germany, Japan, Brazil and Australia) and concluded that the cut date in football is the main cause that effects the relative age in professional football.

Other studies that analysed the RAE in the formation ages of sport groups, such as the essays by Helsen, Starkes, and Van Winckel (1998), whose results indicated that youth football players born between August and October (the first part of the year for the selection) are more probable to be identified as talented and to be exposed to higher levels of training, whilst the players born at the end of the year tended to drop out at 12 years of age. Also an essay with young footballers by Ashworth, and Heyndels (2007), proved that players born after the cut-off date earned higher wages.

The results of the Helsen, Van Winckel, and Williams (2005) investigation show an excessive representation of players born in the first three months of the year (from January to March) for all youth National Teams in the under 15 years of age (U-15), U-16, U-17 and U-18, same being for the UEFA Sub-16 and the Meridian Cup. The players with a relatively older age are more probable of being identified as talents, because of the probable physical advantages that they have over the others. Continuing with football at professional level, Jullien, Turpin, and Carling (2008) concluded that coaches tend to select players born in the first four months of the year.

Carling, le Gall, Reilly, and Williams (2009) investigated whether the maturity, the anthropometric profile and the valuation of physical state varied in the distribution of the date of birth in the elite. This study suggested that the relative age of the athlete doesn't always relate to a significant advantage in physical components.

In basketball, the investigation by Esteva, Drobic, Puigdellivol, Serratosa, and Chamorro (2006), determined a strong tendency to select players born in the first three months of the year compared to those born towards the end of the year. This tendency tends to lose its strength as the players go through the categories, until arriving to professional basketball. This is explained because in the first stages of the sport, the players are selected only because of their advanced maturity or other indicators such as height. This way, a great quantity of possible future talents are lost and other players

have more opportunities of getting to become professional players only because they were born in the first three months of the year.

Delorme, and Raspaud (2009) found clear differences in the relative age effect in French athletes aged between 7 and 18 years, in both male and female categories. They also studied the height of the players, finding that the ones born in the first two terms of the year were taller. Also, Delorme, Chalabaev, and Raspaud (2011) investigated the relative age effect as a factor for abandoning sport in basketball players finding a higher index of leaves in players born at the end of the year.

Lidor, Côte, Arnon, Zeev, and Cohen-Maoz (2010) studied the effects in a small country (Israel) of the relative age and the place of birth of the players in various sports, in which basketball was included. No significant relative age effect was found nor the effect of the place of birth.

Baker, Schorer, and Cobley (2010) revised the possible causes of the RAE and suggest some solutions. The most use explication for justifying the RAE is the process of maturation of the athletes: the athletes born nearer the cut-off date have higher values of performance than the younger ones (Barnsley, & Thompson, 1988; Malina, 1994; Malina, Bouchard, & Bar-Or, 2004). The solutions suggested tend to be related to the variation of the age, which means that the RAE changes but is persistent (Helsen, *et al.*, 2000; Musch, & Hay, 1999; Simmons, & Paull, 2001). Other solutions suggest an enormous administrative complex, such as the one by Barnsley and Thompson (1988) who say that the selection of participants should adjust to a certain distribution or control of the average age in all sorts of teams Helsen *et al.* (1998; 2000).

The objective of this present study is to check whether the relative age effect does exist in the World Basketball Championship U17, U19 and U21 male categories. Investigate if the relative age effect exists in the different specific positions and also try to find differences in height between players and in the performance depending on their date of birth.

Material and Methods

Sample

The athletes were selected from the last male and female edition of the Basketball World Championships U17 played in 2010, U19 played in 2011 and U21 played in 2005 in the male category and in 2007 in the female category. The total number of athletes of the sample is of 954, of which 472 are from the male category (143 player in the U17, 191 in U19 and 138 in U21) and 482 from the female category (144 players in the U17, 194 in U19 and 144 in U21).

The "International Basketball Amateur Federation" (FIBA) is the only organization responsible in basketball and known to the International Olympic Committee (COI), formed by 213 National Federations of this sport. This institution is responsible of controlling and regulating all international competitions. In the World Championship in the U17, U19 and U21 the participation of the athletes must be that age or younger. The criteria selection used indicates that at least 10 participating athletes are born in the same year. Applying to this rule, in the analysis, in the male category a 15 year old athlete was excluded in the U17, another aged 16 in the U19 and eight athletes in the U21 (seven players were 18 years old and one were 17). In the female category five players aged 15 and two aged 17 were excluded in the U17, seven players aged 16 and two aged 15 in the U19 and four players aged 17 and two aged 16 in the U21.

Procedure

The following variables were studied: gender, category, season, team, classification, position, and date of birth.

Also the height of the players was registered and the relative variables of the performance of the players (games played, minutes played, converted field goals, tries, and the percentage of effectiveness, two point field goals, tries, and the percentage of effectiveness, three point field goals, tries, and the percentage of effectiveness, free goals scored, tried, and the percentage of effectiveness, defensive rebounds, offensive and total of rebounds, assistances, personal faults, recuperations, stolen, blocked, points, points per game, rebounds per game and game assistance).

The information was collected from the FIBA website (<http://www.fiba.com/>). Afterwards the variable term was generated, dividing the date of births of the players into 4 terms (quarters) that start from the 1st of January and ends the 31st of December of the same year. This way the athletes born from the 1st of January until the 31st of

March form the first term (Q1), the players born from the 1st of April until the 30th of June form the second term (Q2), the players born from the 1st of July until the 30th of September belong to the third quarter (Q3) and finally the players born from the 1st of October until the 31st of December make up the fourth term (Q4).

Analysis of information

To determine the relative age effect (RAE) the Chi-squared test was used to determine if the distribution of the dates of birth differ significantly of the theory distribution that is hoped to be found (in which the probability of finding athletes born in whichever term of the year is the same).

To compare between the height of the players and the relative performance variables for each term of birth the ANOVA was used and the analysis post-hoc with Turkey, previous guarantee of normality (Kolmogorov-Smirnov test) and the equality (Levene test). In the case that the requirements of application were not met the use of ANOVA is rejected and the Kruskal- Wallis test is used.

In this study the statistic tests are considered significant when $p < 0.05$.

Results

Table 1 shows the term distribution of the birth dates of all players of the basketball world championships in lower categories.

The global distribution observed is different than expected in both male ($\chi^2=52.41$; d.f.=3; $p < 0.001$; Figure 1), and female categories ($\chi^2=45.43$; d.f.=3; $p < 0.001$; Figure 2).

Table 1.- Terms of the date of births of all players in the Basketball World championships U17, U19 y U21.

Gender		Overall		U17		U19		U21	
		<i>Observed</i>	<i>Expected</i>	<i>Observed</i>	<i>Expected</i>	<i>Observed</i>	<i>Expected</i>	<i>Observed</i>	<i>Expected</i>
Males	Q1	176	118	66	35.8	68	47.8	42	34.5
	Q2	126	118	38	35.8	49	47.8	39	34.5
	Q3	102	118	26	35.8	47	47.8	28	34.5
	Q4	68	118	12	35.8	27	47.8	29	34.5
	Total	472		143		191		138	
	χ^2	52.41		43.66		17.65		4.32	
	Sig.	0.000		0.000		0.001		0.229	
	Gender		Overall		U17		U19		U21
		<i>Observed</i>	<i>Expected</i>	<i>Observed</i>	<i>Expected</i>	<i>Observed</i>	<i>Expected</i>	<i>Observed</i>	<i>Expected</i>
Females	Q1	159	120.5	50	36	71	48.5	38	36
	Q2	144	120.5	40	36	57	48.5	47	36
	Q3	102	120.5	31	36	38	48.5	33	36
	Q4	77	120.5	23	36	28	48.5	26	36
	Total	482		144		194		144	
	χ^2	35.43		11.28		22.87		6.50	
	Sig.	0.000		0.010		0.000		0.090	

When analysing the categories in the U17 competition, the distribution observed is different than the uniform expected in the male ($\chi^2=43.66$; d.f.=3; $p<0.001$) and female categories ($\chi^2=11.28$; d.f.=3; $p<0.011$). The same happened in the U19 category in both the male ($\chi^2=17.65$; d.f.=3; $p<0.001$) and female categories ($\chi^2=22.87$; d.f.=3; $p<0.001$). Finally in the U21 category the distribution observed doesn't differ greatly from the statistic form expected in neither male ($\chi^2=4.32$; d.f.=3; $p<0.229$) nor female categories ($\chi^2=6.50$; d.f.=3; $p<0.091$).

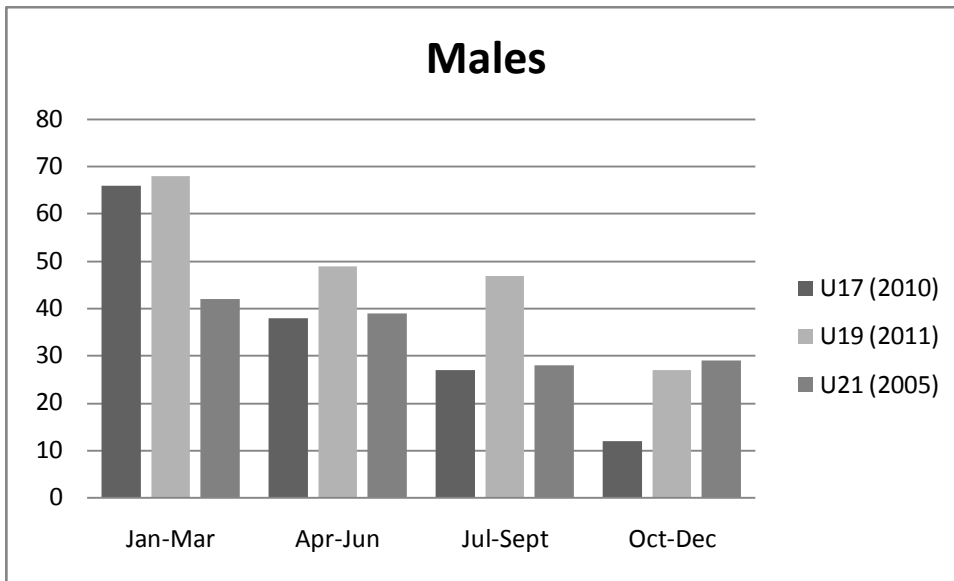


Figure 1.- Distribution of the dates of birth in function of age in the male categories.

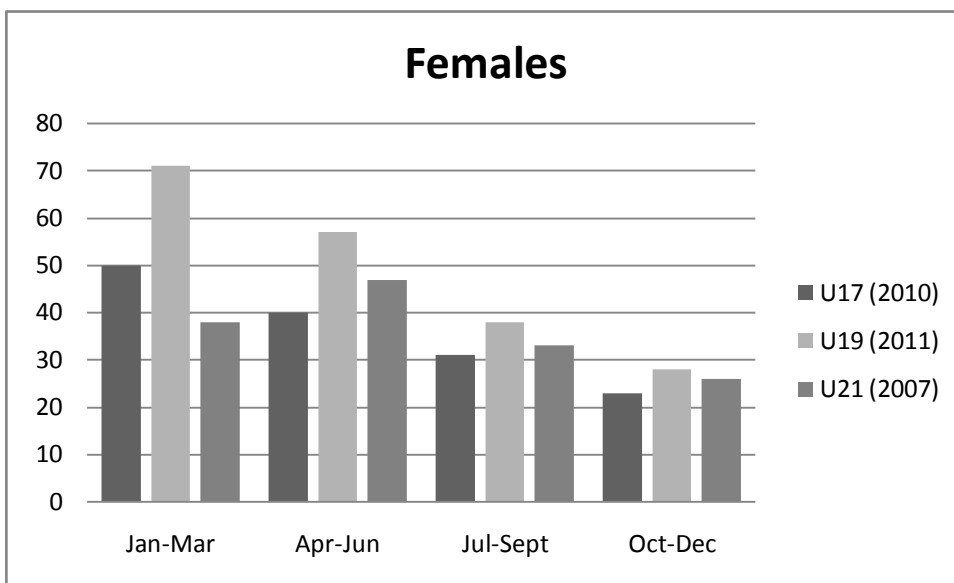


Figure 2.- Distribution of the dates of birth in function of age in the female categories.

Specific positions

In the analysis of the specific positions (table 2) a different distribution was found in the birth terms than the one expected in all of the positions ($p < 0.05$) in the male category, being more distinct in the positions that require higher physical form (centre and power forward). In the female category the distribution in terms are different in the point guard, shooting guard and small forward ($p < 0.05$)

Table 2.- Birth terms of players in the Basketball World Championships in function of specific positions.

Gender		Point-Guard		Shooting-Guard		Small-Forward		Power-Forward		Center	
		<i>Obs.</i>	<i>Exp.</i>	<i>Obs.</i>	<i>Exp.</i>	<i>Obs.</i>	<i>Exp.</i>	<i>Obs.</i>	<i>Exp.</i>	<i>Obs.</i>	<i>Exp.</i>
Males	Q1	21	12.8	24	11.8	22	15.3	19	11.8	20	18
	Q2	6	12.8	7	11.8	18	15.3	12	11.8	27	18
	Q3	18	12.8	10	11.8	14	15.3	11	11.8	15	18
	Q4	6	12.8	6	11.8	7	15.3	5	11.8	10	18
	Total	51		47		61		47		72	
	χ^2	14.65		17.77		8.05		8.40		8.78	
	Significance	0.002		0.000		0.045		0.038		0.032	
Gender		Point-Guard		Shooting-Guard		Small-Forward		Power-Forward		Center	
		<i>Obs.</i>	<i>Exp.</i>	<i>Obs.</i>	<i>Exp.</i>	<i>Obs.</i>	<i>Exp.</i>	<i>Obs.</i>	<i>Exp.</i>	<i>Obs.</i>	<i>Exp.</i>
Females	Q1	19	10	24	13.5	17	13.3	11	11.5	22	20.3
	Q2	11	10	9	13.5	21	13.3	13	11.5	23	20.3
	Q3	4	10	13	13.5	5	13.3	10	11.5	22	20.3
	Q4	6	10	8	13.5	10	13.3	12	11.5	14	20.3
	Total	40		54		53		46		81	
	χ^2	13.40		11.93		11.53		0.44		2.61	
	Significance	0.004		0.008		0.009		0.933		0.457	

Height of Players

When comparing height in the four terms, significant differences were found ($p < 0.008$) in the male category, although no differences were found using the post-hoc analysis between the first and fourth term, two homogeneous subsets were defined, the first formed by the heights of the first (195 cm), third (195.41 cm) and fourth terms (197.86 cm); the second is formed by the second (198.45 cm) third (195.41 cm) and fourth terms (197.86 cm).

In the female categories no significant differences were found.

Performance

Male category:

In the U17 category after the application of the Kruskal-Wallis test, significant differences were found ($p < 0.017$) in the percentage of three point field throws, showing better percentages in players born in the first (22.5%) or in the second term (22.8%) of the year than players born in the third (20.0%) and fourth terms (21.4%).

In the U19 category significant differences were found ($p < 0.036$) using the Kruskal-Wallis test in the points obtained per game with values of 6.7% for the first term, 7.3% for the second term, 5.2% for the third term and 6.8% for the last term.

In the U21 category no significant differences were found in neither of the variables studied.

Female category:

No significant differences were found in the performance by terms in the U17 category.

In the U19 category differences were found in the percentage of field throws ($p < 0.005$) with lower percentages in the first (33.1%) and second terms (34.8%) in relation to the third (41.7%) and fourth terms (39.2%). In the percentage of the two points ($p < 0.005$) the same performance and values were found in all four terms respectively, 35.2%; 36.9%; 46.6% & 41.1%. The assistances ($p < 0.013$) show values of 8.9%, 4.7%, 7.1% & 7.1% for the four terms respectively, showing lower values in the second term. The assistances per game ($p < 0.013$) show values of 1.17%, 0.64%, 0.95% & 0.94% for the four terms, also showing lower values in the second term.

Finally in the U21 category no significant values were found in the performance in function of the term born in.

Discussion

In the present study the existence of the relative age effect has been confirmed in the Basketball World Championships in U17 and U19. In the U21 championship no significant differences were found. The same behaviour was found in the male and

female category. Also, the effects in the relative age persist when talking about specific positions, proving to be more distinct in the positions that require more height in the male category. In the female category the effects of the relative age are more significant in the positions that require less height. However, the height of the players doesn't show expected values if the relative age effect exists. No significant differences were found in the height of the players analysed. Finally, small variations have been found in the performance of the players in function of the term birth in both male and female categories, although these variations do not coincide with the existence of the relative age effect.

The existence of the relative age effect in basketball has been documented by various authors (Delorme, & Raspaud, 2009; Delmore *et al.* 2010; Esteva *et al.* 2006) in male categories. Most investigations made refer to male sport and few have been done in female categories and even less in basketball. Delorme *et al.* (2010) found a relative age effect in female basketball and Roman, and Fuchslocher (2011) found it in football in 2011. These studies, the same as the present one, disagree with the ones done by Delorme, and Raspaud (2009) who found no relative age effect in female basketball. This effect may have been found in other young athletes in other sport disciplines (Ashworth, & Heyndels, 2007; Helsen *et al.* 1998; 2005).

The same as in this study, the investigations done in German football by Schorer, Cogley, Büsch, Bräutigam, and Baker, (2009) or in handball by Gutiérrez, Saavedra, Contreras, and Fernández, (2012) found a slight fall in the relative age effect as the age of the athlete's increments.

Schorer, Cogley *et al.* (2009) documented a relative age effect in different specific positions in German football, proving results that correspond with the obtained in the present study in the male categories, as the positions that require a higher physical form are taken preferably by athletes born in the first months of the year. The results found in female categories do not support the idea of the relative age effect as the players born in the first months of the year tend to take base point, shooting guard and small guard positions, which are less dependent on biologic maturity. However, in football, Roman and Fuchslocher (2011) found a stronger relative age effect in goalkeeping and defence positions than in midfield and upfront positions.

In the present study no relative age effect was found in function of height or performance of the players. Schorer, Baker, Büsch, Wilhelm, and Pabst (2009) documented similar results in handball and determined that the cause of RAE isn't related to neither height, weight nor technical abilities, as no differences were found between relatively older and younger players. Neither anthropometric factors nor physical performance in young footballers found a RAE (Carling, Gall, Reilly, & Williams, 2009; Hirose, 2009).

Conclusions

The relative age effect exists and is significant in the Basketball World Championships in both male and female U17 and U19. This effect reduces as the age of the athlete's increases and disappears in U21.

In specific positions the effect of the relative age is also significant, being in the male category clearer in the centres, power forwards and small forwards and less in point guards and shooting guards. In the female category the results do not support the existence of the relative age effect.

In the male category, differences were found in the height of the players in function of the term of birth, although these differences do not coincide with the expected if the relative age effect exists. However, no significant differences were found in height in the female categories.

The performance of the players in function of the birth term, show minimum differences in the male category in the U17, the players born in the first two terms obtained better percentages in the three point field throws than the ones born in the last terms of the year. In the U19, the points obtained are less in players that belong to the third term than the rest of the terms. In the female category some differences were found in the U19 but they do not support the existence of the RAE and no differences were found in neither U17 nor U21.


Bibliography

Armstrong, H. G. (1966). A comparison of the performance of summer and autumn-born children at eleven and sixteen. *British Journal of Educational Psychology*, 36, 72–76.

- Ashworth, J., & Heyndels, B. (2007). Selection bias and peer effects in team sports: The effect of age grouping on earnings of German soccer players. *Journal of Sports Economics*, 8, 355–377.
- Baker, J.; Schorer, J., & Cogley, S. (2010). Relative age effects. An inevitable consequence of elite sport? *Sportwissenschaft*, 40, 26-30.
- Barnsley, R. H., & Thompson, A. H. (1988). Birthdate and success in minor hockey: the key to the NHL. *Canadian Journal of Behavioural Science*, 20, 167–176.
- Carling, C.; le Gall, F.; Reilly, T., & Williams, A. M. (2009). Do anthropometric and fitness characteristics vary according to birth date distribution in elite youth academy soccer players? *Scandinavian Journal of Medicine & Science in Sports*, 19(1), 3-9.
- Delorme, N., & Raspaud, M. (2009). Is there an influence of relative age on participation in non-physical sports activities? The example of shooting sports. *Journal of Sports Sciences*, 27(10), 1035-1042.
- Delmore, N.; Chalabaev, A., & Raspaud, M. (2011). Relative age is associated with sport dropout: evidence from youth categories of French basketball. *Scandinavian Journal of Medicine & Science in Sports*, 21(1), 120-128.
- Esteva, S.; Drobnic, F.; Puigdellivol, J.; Serratosa, L., & Chamorro, M. (2006). Fecha de nacimiento y éxito en el baloncesto profesional. *Medicina de l'esport*, 41(149).
- Freyman, R. (1965). Further evidence on the effect of date of birth on subsequent school performance. *Educational Research*, 8, 58–64.
- Gibbs, B. G.; Jarvis, J. A., & Dufur, M. J. (2011). The rise of the underdog? The relative age effect reversal among Canadian-born NHL hockey players: A reply to Nolan & Howell. *International Review for the Sociology of Sport*, 1012690211414343, first published on the 22nd of August, 2011.
- Grondin, S.; Deshaies, P., & Nault, L. P. (1984). Trimestres de naissance et participation au hockey et au volleyball. *La Revue Québécoise de l'Activité Physique*, 2, 97–103.
- Gutiérrez, Ó.; Saavedra, M.; Contreras, J., & Fernández, J. J. (2012). Influencia del año de nacimiento de una jugadora en las posibilidades de ser captada como talent en el balonmano femenino internacional. *Apunts*, 108(2), 46-52.
- Helsen, W. F.; Starkes, J. L., & Van Winckel, J. (1998). The influence of relative age on success and dropout in male soccer players. *American Journal of Human Biology*, 10(6), 791-798.

- Helsen, W. F.; Starkes, J. L., & Van Winckel, J. (2000). Effect of a change in selection year on success in male soccer players. *American Journal of Human Biology*, 12, 729–735.
- Helsen, W. F.; Van Winckel, J. L., & Williams, A. M. (2005). The relative age effect in youth soccer across Europe. *Journal of Sports Sciences*, 23, 629–636.
- Hirose, N. (2009). Relationships among birth-month distribution, skeletal age and anthropometric characteristics in adolescent elite soccer players. *Journal of Sports Sciences*, 27(11), 1159-1166.
- Jullien, H.; Turpin, A., & Carling, C. (2008). Influence of birth date on the career of French professional soccer players. *Science & Sports*, 23, 149-155.
- Lidor, R.; Côte, J.; Arnon, M.; Zeev A., & Cohen-Maoz, S. (2010). Relative Age and Birthplace Effects in Division 1 Players – Do They Exist in a Small Country? *Talent Development and Excellence*, 2(2), 181-192.
- Malina, R. M. (1994). Physical growth and biological maturation of young athletes. *Exercise and Sport Sciences Reviews*, 22, 389–434.
- Malina, R. M.; Bouchard, C., & Bar-Or, O. (2004). *Growth, maturation, and physical activity*. Champaign Illinois: Human Kinetics.
- Musch, J., & Hay, R. (1999). The relative age effect in soccer: Cross-cultural evidence for a systematic discrimination against children born in late competition year. *Sociology of Sport*, 16, 54–64.
- Nolan, J. E., & Howell, G. (2010). Hockey success and birth date: The relative age effect revisited. *International Review for the Sociology of Sport*, 45(4) 507–512.
- Roman, M., & Fuchslocher, J. (2011). Influence of the Selection Level, Age and Playing Position on Relative Age Effects in Swiss Women’s Soccer. *Talent Development and Excellence*, 3(2), 239-247.
- Russell, R. J. H., & Startup, M. J. (1986). Month of birth and academic achievement. *Personality and Individual Differences*, 7(6), 839-846.
- Schorer, J.; Baker, J.; Büsch, D.; Wilhelm, A., & Pabst, J. (2009). Relative age, talent identification and youth skill development: Do relatively younger athletes have superior technical skills? *Talent Development and Excellence*, 1, 45–56.
- Schorer, J.; Cobley, S.; Büsch, D.; Bräutigam, H., & Baker, J. (2009). Influences of competition level, gender, player nationality, career stage and playing position on relative age effects. *Scandinavian Journal of Medicine & Science in Sports*, 19, 720–730.

Simmons, C., & Paull, G. C. (2001). Season-of-birth bias in association football. *Journal of Sports Sciences*, 8, 677–686.

 **27-Julio-2012: Revisión Mayor.**

Veintitrés días después del envío del artículo, se recibió la respuesta de los revisores de la revista indicándose las modificaciones que se debían realizar en el documento para su aceptación, siendo estas de una magnitud considerable. A continuación, se adjuntan los comentarios de los revisores con las modificaciones que se debían llevar a cabo.

Decision Letter (IRSS-12-0082)**From:** irsseditor@gmail.com**To:** miguel.saavedra@udc.es**CC:****Subject:** International Review for the Sociology of Sport - Decision on Manuscript ID IRSS-12-0082**Body:** @@date to be populated upon sending@@

Dear Dr. Saavedra Garcia:

Manuscript ID IRSS-12-0082 entitled "RELATIVE AGE EFFECT IN LOWER CATEGORIES OF INTERNATIONAL BASKETBALL" which you submitted to the International Review for the Sociology of Sport, has been reviewed. The comments of the reviewer(s) are included at the bottom of this letter.

Before it can be published in the IRSS the manuscript requires considerable revision prior to resubmission. The reviewer(s) find merit in your paper but there are substantial concerns that will need attention in revision. I encourage you to respond to the comments by reviewer(s) and revise your manuscript.

Let me comment briefly. Of the two reviewers, Reviewer 1 is most positive, with central concerns really only about findings and conclusions concerning "U-21." Here, the questions that Reviewer 1 raises are important, and I will look for you to speak to those in revision. In contrast, Reviewer 2 has advised me that the "paper needs a lot of work" but has much potential. Reviewer 2 finds the paper original and unique, but finds that the paper offers very little to the existing literature; in revision I will look for you to more clearly make the case where and how this study advances understanding concerning RAE. Reviewer 2 also makes a good point that your literature review needs to more clearly speak to the area of your concern and needs to bring context that will inform your findings; I will look for clear evidence that the literature review section has improved to achieve these goals. Reviewer 2 points to three pages where clarification and/or improvement in writing is needed; please address these in revision. Perhaps most importantly, Reviewer 2 raises questions about the importance of the conclusion; this is the most significant area where I think your study can improve: please speak to the issues that Reviewer 2 makes concerning the conclusions in clear ways as you revise your manuscript. Finally, I ask that you think about and speak to the issues concerning samples and their generalizability that Reviewer 2 raises as a "side note;" such issues are endemic in this kind of research and transparency and recognition of these issues will improve your report.

To revise your manuscript, log into <http://mc.manuscriptcentral.com/irss> and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

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You will be unable to make your revisions on the originally submitted version of the manuscript. Instead, revise your manuscript using a word processing program and save it on your computer. Please also highlight the changes to your manuscript within the document by using bold or colored text.

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When submitting your revised manuscript, you will be able to respond to the comments made by the reviewer(s) in the space provided. You can use this space to document any changes you make to the original manuscript. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewer(s).

IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission.

Because we are trying to facilitate timely publication of manuscripts submitted to the International Review for the Sociology of Sport, your revised manuscript should be uploaded as soon as possible. If it is not possible for you to submit your revision in a reasonable amount of time, we may have to consider your paper as a new submission.

Once again, thank you for submitting your manuscript to the International Review for the Sociology of Sport and I look forward to receiving your revision.

Sincerely,
Dr. Lawrence Wenner
Editor in Chief, International Review for the Sociology of Sport
irsseditor@gmail.com

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author

A significant contribution to the RAE discussion. My only question would be if you felt the U-21 insignificance was an outlier, or whether RAE actually does diminish from U-21 onward. Perhaps a study of FIBA professionals would be in order (perhaps using the World Championship or Olympic rosters?) This topic is also ripe for meta-analysis. The authors are to be commended for a strong, insightful paper.

Reviewer: 2

Comments to the Author

This paper is original. With the use of FIBA data, the author finds a fading RAE effect across ages, with some variation by position played and some difference by gender. This article is unique but offers very little to the existing literature. There may be some contribution by demonstrating the fading influence of the RAE over time but there is no real attempt to conceptualize this trend in the data.

The literature review is a list of relevant studies but does little to point towards a conclusion of the author. Does the fading effect square or diverge from existing literature? The fading effect seems to square with Wattie et al. 2007 and Gibbs et al. 2011 argument that RAE diminishes over time. In my view, this needs to be a central feature of the paper's framing.

Page 7.

Can 18 year olds play in U21. Clarify.

Is this a sample or the population?

"FIBA is the only organization responsible in basketball" What does this mean?

Page 9

post-hoc with Turkey? What does this mean?

Page 10

Rephrase "observed doesn't differ greatly from the statistic form" (line 26)

Page 13

Rephrase "most investigations made refer to male sport" (line 43)

What is the big conclusion? How does what the author finds help the literature think differently? Does this work seek to clarify, confuse, revise arguments in the literature? Need much more thought-provoking insights in the framing and conclusion of the paper.

****A side note****

I will say that I do struggle to understand the use of significance testing in this literature more generally when full populations are used. It is simply misleading to say one number is not significantly different from another when they are indeed different numbers. Because a whole population is known, the numbers are what they are. I don't fault the author, given that this appears to be an industry standard, but I am somewhat confused why inferential statistics are used to infer what the whole population *would* be when the author (from best I can tell) is indeed examining the whole population.

Date Sent: 27-Jul-2012

4- Septiembre-2012: respuesta a la revisión mayor:

El siguiente paso, una vez leídas las indicaciones realizadas por parte de los revisores de la revista, fue realizar las modificaciones pertinentes para lograr dar respuesta a todas sus peticiones. A continuación, se adjuntan todas las aclaraciones y cambios realizados que fueron enviados a la revista para cumplir con los objetivos propuestos por los revisores.

REVIEWER	COMENTS TO THE AUTHOR	OUR REVISION
1	A significant contribution to the RAE discussion. My only question would be if you felt the U-21 insignificance was an outlier, or whether RAE actually does diminish from U-21 onward. Perhaps a study of FIBA professionals would be in order (perhaps using the World Championship or Olympic rosters?) This topic is also ripe for meta-analysis. The authors are to be commended for a strong, insightful paper.	We don't think the U-21 insignificance was an outlier, similar results are observed by other authors as Drobnic, Puigdellivol, Serratosa, & Chamorro (2006) in basketball or Gibbs et al. (2011) in Canadian Ice Hockey.
2	This paper is original. With the use of FIBA data, the author finds a fading RAE effect across ages, with some variation by position played and some difference by gender. This article is unique but offers very little to the existing literature. There may be some contribution by demonstrating the fading influence of the RAE over time but there is no real attempt to conceptualize this trend in the data. The literature review is a list of relevant studies but does little to point towards a conclusion of the author. Does the fading effect square or diverge from existing literature? The fading effect seems to square with Wattie et al. 2007 and Gibbs et al. 2011	We changed the introduction and we classified the studies into three classes: 1. Studies that found that age bias is not only prevalent in the minor leagues but also carries over into the professional leagues. 2. Another studies found that relative age effect is only prevalent in lower categories, diminishing over the time and being not present in professional sport (we explain the fading effect here). 3. Studies that don't find RAE.

	argument that RAE diminishes over time. In my view, this needs to be a central feature of the paper's framing.	
2	Can 18 year olds play in U21. Clarify.	In the World Championship in the U17, U19 and U21 the participation of the athletes must be that age or younger, this way a 18 year old player can play in U21 championship.
2	Is this a sample or the population?	Our paper analyze the population, we changed it in our paper.
2	"FIBA is the only organization responsible in basketball" What does this mean?	The "International Basketball Amateur Federation" (FIBA) defines the international rules of basketball and is responsible of controlling and regulating all international competitions
2	post-hoc with Turkey? What does this mean?	It is an error, the correct phrase is this one: Post-hoc analysis using Tukey range test.
2	Rephrase "observed doesn't differ greatly from the statistic form" (line 26)	Finally in the U21 category the distribution observed doesn't differ from the expected
2	Rephrase "most investigations made refer to male sport" (line 43)	Most investigations analyze male sport
2	What is the big conclusion?	The relative age effect exists and is significant in the Basketball World Championships in both male and female U17 and U19. This effect diminishes as the age of the athlete's increases and disappears in U21
2	How does what the author finds help the literature think differently?	Relative age effect is not studied in lower FIBA Basketball categories, we found this fading effect in our paper.
2	Does this work seek to clarify, confuse, revise arguments in the literature?	We believe that the existence of RAE can be used by FIBA for changing the way of making groups and this way avoid this effect.

2	Need much more thought-provoking insights in the framing and conclusion of the paper.	Introduction and conclusions was changed
A side note	I will say that I do struggle to understand the use of significance testing in this literature more generally when full populations are used. It is simply misleading to say one number is not significantly different from another when they are indeed different numbers. Because a whole population is known, the numbers are what they are. I don't fault the author, given that this appears to be an industry standard, but I am somewhat confused why inferential statistics are used to infer what the whole population *would* be when the author (from best I can tell) is indeed examining the whole population.	We agree Reviewr 2. Anyway we are analyzing a population in a time point and, maybe the time question is the key. This championships was played in the past and will be played again in the future, this way the population concept is not absolute.

✚ 5-Septiembre-2012: Revisión Menor

Al día siguiente del envío del artículo con las correcciones realizadas, se recibió la respuesta por parte los revisores de la revista con algunas modificaciones y explicaciones que habría que llevar a cabo para la aceptación final del artículo. En esta ocasión, los cambios a realizar fueron mucho menores y responden principalmente, a modificaciones de tipo formal.

Decision Letter (IRSS-12-0082.R1)**From:** irsseditor@gmail.com**To:** miguel.saavedra@udc.es**CC:****Subject:** International Review for the Sociology of Sport - Decision on Manuscript ID IRSS-12-0082.R1**Body:** @@date to be populated upon sending@@

Dear Dr. Saavedra García:

The revision of your Manuscript ID IRSS-12-0082.R1 entitled "RELATIVE AGE EFFECT IN LOWER CATEGORIES OF INTERNATIONAL BASKETBALL" which you submitted to the International Review for the Sociology of Sport, has been reviewed by our editorial team. I wish to commend you on the careful changes that were made based on the comments of reviewers on the original version.

I look forward to publishing this manuscript in the IRSS. However, I ask that some final minor changes to ready the manuscript for production. Here is what I ask be done. First, please review the attached SAGE Harvard Style Guide that is used by the IRSS to make sure that both your in-body citation styles and Reference list style fully conforms to the house style. In particular, I noted that some of your in-body citations used the "&" rather "and" conventions as required in our style. As well please change your section entitled Bibliography to read References and make sure that only those references that actually appear in the manuscript itself are included in the References section. Beyond these issues, I ask that some minor style issues be addressed. First, I ask that each new paragraph is indented and that there be no line spaces between paragraphs. Second, I noted that you had a number of one sentence paragraphs and that their brevity is odd. Please work to incorporate these one sentence paragraphs into adjacent paragraphs; I think the logic will be retained and the readability improved.

To revise your manuscript, log into <http://mc.manuscriptcentral.com/irss> and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

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Once again, thank you for submitting your manuscript to the International Review for the Sociology of Sport and I look forward to receiving your revision.

Sincerely,
Dr. Lawrence Wenner
Editor in Chief, International Review for the Sociology of Sport
irsseditor@gmail.com

Date Sent: 05-Sep-2012**File 1:** [SAGE-Harvard-reference-style-1.pdf](#)

✚ 6-Septiembre-2012: Respuesta la Revisión Menor:

Una vez vistas y tenidas en cuenta las últimas indicaciones realizadas por los revisores, se realizaron los cambios oportunos, para así satisfacer las demandas de la revista.

✚ 6-Septiembre-2012: Aceptación del artículo:

Tras enviar el artículo a la revista con las modificaciones pertinentes, se recibió la confirmación de aceptación para su publicación en la revista “*International Review for the Sociology of Sport*”.

The screenshot shows the author dashboard for the journal 'International Review for the Sociology of Sport'. The page title is 'Submission Confirmation'. It includes a navigation menu with 'Main Menu', 'Author Dashboard', and 'Submission Confirmation'. The user is logged in as 'Miguel Saavedra García'. The main content area displays the following information:

- Manuscript ID: IRSS-12-0082.R2
- Title: RELATIVE AGE EFFECT IN LOWER CATEGORIES OF INTERNATIONAL BASKETBALL
- Authors: Saavedra García, Miguel; Gutiérrez Aguilar, Óscar; Fernández Romero, Juan J; Fernández Lastra, David; Eiras Oliveira, Gabriel
- Date Submitted: 06-Sep-2012

At the bottom, there are links for 'Print' and 'Return to Dashboard', along with copyright information for ScholarOne Manuscripts and a 'Follow ScholarOne on Twitter' button.

✚ 4-Octubre-2012: Galeradas:

En esta fecha, se recibió por parte de otro departamento de la revista las galeradas. En ellas, se pide que se haga una revisión sobre ciertos aspectos, (todos ellos de tipo formal) para comprobar que todo este correcto y se pueda realizar la publicación del trabajo.

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11	Please confirm figures for male U17 in Table 1, as $66 + 38 + 26 + 12 = 142$.

✚ 5-Octubre-2012: Respuesta a las Galeradas:

Una vez recibidas las galeradas, se procedió a realizar un examen de los puntos detallados por parte de la revista y de esta manera, indicar a los editores las modificaciones que han de realizar.

A continuación, se adjuntan los cambios que han de realizar los editores de la revista

1	<p>Please check whether the author names are correct as inserted.</p> <p>In Spain we have two surnames, you use our second surname but only use the initial letter of our first surname. First surname is the main for us and is needed to type all the letters. This way, I would like you include the complete names as follow:</p> <p>Miguel Saavedra García University of A Coruña, Spain</p> <p>Óscar Gutiérrez Aguilar University Miguel Hernández, Spain</p> <p>Juan J. Fernández Romero University of A Coruña, Spain</p> <p>David Fernández Lastra University of A Coruña, Spain</p> <p>Gabriel Eiras Oliveira University of A Coruña, Spain</p>
2	<p>Please check whether the corresponding author details are correct as given.</p> <p>Please add first surname Saavedra instead S: Miguel Saavedra García, Department of Physical Education and Sports, University of A Coruña, Avd. Ernesto Che Guevara, 121, Pazos – Lians, 15179 Oleiros, A Coruña, Spain. Email: miguel.saavedra@udc.es</p>

3	<p>Please confirm my addition of ‘and female’ to the paragraph beginning ‘The objective of this present study...’.</p> <p>Confirmed, the female addition is necessary, thanks!</p>
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5	<p>Please provide a reference in the reference list for the FIBA website.</p> <p>FIBA.com (2012) <i>FIBA Archive</i>. Aviable at: http://archive.fiba.com, accessed 13 May 2012.</p>
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7	<p>Please confirm whether the given funding statement is accurate and correct.</p> <p>It is accurate and correct: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.</p>
8	<p>Please confirm Gall/le Gall in the reference Carling et al. (2009).</p> <p>le Gall is the correct way.</p>
9	<p>Please provide full publication information for the reference Gibbs et al. (2011).</p> <p>This is the citation copied from Gibbs: Gibbs BG, Jarvis JA and Dufur MJ (2011) The rise of the underdog? The relative age effect reversal among Canadian-born NHL hockey players: A reply to Nolan & Howell. <i>International Review for the Sociology of Sport</i>, 1-6. It is an article from your publication <i>International Review for the Sociology of Sport</i>: http://irs.sagepub.com/content/early/2011/08/19/1012690211414343.abstract http://irs.sagepub.com/content/early/2011/08/19/1012690211414343.full.pdf+html</p>
10	<p>Please note that ‘a and b’ have been added to references ‘Schorer, Baker, Büsch, et al. (2009a)’ and ‘Schorer, Cobley, Büsch, et al. (2009b)’ to avoid confusion between two references with identical year. Please confirm that this is correct.</p> <p>I agree, thank you!</p>
11	<p>Please confirm figures for male U17 in Table 1, as $66 + 38 + 26 + 12 = 142$.</p>

Sorry, 142 is the correct value.

✚ 30-Octubre-2012: Primera publicación online:

En este día, se recibió el correo por parte de los editores de la revista en el cual se informaba de la publicación online del artículo, adjuntándose el número de identificación digital (DOI): 10.1177/1012690212462832. El enlace a través del cual se puede encontrar el trabajo es el siguiente:

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Relative age effect in lower categories of international basketball

Miguel Saavedra García, Óscar Gutiérrez Aguilar, Juan J. Fernández Romero, David
Fernández Lastra and Gabriel Eiras Oliveira

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Abstract

To be able to value the relative age effect in the male and female World Championships played between 2005 and 2010 in the U17 categories (athletes 17 years or younger), U19 (athletes 19 or younger) and U21 (athletes 21 years or younger) a sample of 954 players has been selected. The variables registered were their dates of birth, the category of the competition, gender, height and official statistics of each player obtained from the International Basketball Federation (FIBA). A clear relative age effect was found (in both male and female categories) fading with age, being higher in the U17 category, slightly less but also significant in the U19, and no significant effect found in U21. This effect persists when the different specific positions were analysed in the male categories, being clearer in the positions that require more physical strength. In female categories the results do not back the existence of the relative age effect. Also, differences were found in height in the male category with regard to the players' year-quarter of birth, but its interpretation is not consistent with the relative age effect. In the female category no differences were found in height. Finally, the performance difference of the players in the male and female categories hardly varies with regard to the year-quarter of birth.

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Keywords

basketball, performance analysis, relative age effect, World Championship, young athletes

Introduction

The term Relative Age Effect (RAE) has been used to determine the effect of the influence of the date of birth in the performance of the person. The first studies that investigated this effect were done in the education environment (Armstrong, 1966; Freyman, 1965).

Investigations made in the education area by Russell and Startup (1986) based their study in the relevance of being born at the start or at the end of the academic year, concluding that pupils born at the start had an academic advantage over the rest until 18 years of age, but after this age, the ones born at the end of the year gave better performance.

Grondin et al. (1984) were the first to do a study of the RAE in sport, finding an unequal distribution in the dates of birth in the players in different levels of Canadian ice hockey and volleyball, concluding that many players were born near to the cut date. These studies have been revised, updated and confirmed (Gibbs et al., 2011; Nolan and Howell, 2010).

Musch and Hay (1999) investigated the age effect in an intercultural sample (Germany, Japan, Brazil and Australia) and concluded that the cut date in football is the main factor that effects relative age in professional football.

Other studies that analyzed the RAE in the formation ages of sport groups included the essays by Helsen et al. (1998), whose results indicated that youth football players born between August and October (the first part of the year for the selection) are more probable to be identified as talented and to be exposed to higher levels of training, whilst the players born at the end of the year tended to drop out at 12 years of age. Also, an essay with young footballers by Ashworth and Heyndels (2007) proved that players born after the cut-off date earned higher wages.

There are studies that found that age bias is not only prevalent in the minor leagues but also carries over into the professional leagues. The results of the Helsen et al. (2005) investigation show an excessive representation of players born in the first three months of the year (from January to March) for all youth National Teams in the under 15 years of age (U15), U16, U17 and U18, and the same being true for the UEFA Sub-16 and the Meridian Cup. The players with a relatively older age are more likely to be identified as talents because of the probable physical advantages that they have over the other, younger players. Continuing with football at professional level, Jullien et al. (2008) concluded that coaches tend to select players born in the first four months of the year.

Carling et al. (2009) investigated whether the maturity, the anthropometric profile and the valuation of physical state varied in the distribution of the date of birth in the elite. This study suggested that the relative age of the athlete does not always relate to a significant advantage in physical components.

Delorme and Raspaud (2009) found clear differences in the relative age effect in French athletes aged between seven and 18 years, in both male and female categories. They also studied the height of the players, finding that the ones born in the first two terms of the year were taller. Also, Delorme et al. (2011) investigated the relative age effect as a factor for abandoning sport in basketball players, finding a higher index of

leavers in players born at the end of the year. Nolan and Howell (2010) found that age bias is not only prevalent in the minor leagues but also carries over into the National Hockey League (NHL).

Other studies found that relative age effect is only prevalent in lower categories, diminishing over time and not being present in professional sport. In basketball, the investigation by Esteva et al. (2006) determined a strong tendency to select players born in the first three months of the year compared to those born towards the end of the year. This tendency loses its strength as the players go through the categories, until arriving at professional basketball. This is explained because in the first stages of the sport, the players are selected only because of their advanced maturity or other indicators such as height. This way, a great quantity of possible future talents are lost and other players have more opportunities of getting to become professional players only because they were born in the first three months of the year. Gibbs et al. (2011) found that the relative age effect is moderate for the average Canadian National Hockey League player and reverses when examining the most elite professional players.

Lidor et al. (2010) studied the effects in a small country (Israel) of the relative age and the place of birth of the players in various sports, in which basketball was included. No significant relative age effect or the effect of the place of birth was found.

Baker et al. (2010) revised the possible causes of the RAE and suggested some solutions. The most used explanation for justifying the RAE is the process of maturation of the athletes: the athletes born nearer the cut-off date have higher levels of performance than the younger ones (Barnsley and Thompson, 1988; Malina, 1994; Malina et al., 2004). The solutions suggested tend to be related to the variation of the age, which means that the RAE changes but is persistent (Helsen et al., 2000; Musch and Hay, 1999; Simmons and Paull, 2001). Other solutions suggest an enormous administrative complex, such as the one by Barnsley and Thompson (1988) who say that the selection of participants should adjust to a certain distribution or control of the average age in all types of teams Helsen et al. (1998, 2000).

The objective of this present study is to check whether the relative age effect does exist in the World Basketball Championship U17, U19 and U21 male and female categories, to investigate if the relative age effect exists in the different specific positions and also try to find differences in height and in performance between players depending on their date of birth.

Material and methods

Sample

The athlete populations were selected from the last male and female editions of the Basketball World Championships U17 played in 2010, U19 played in 2011 and U21 played in 2005 in the male category, and in 2007 in the female category. The total number of athletes in the sample is 954, of which 472 are from the male category (143 player in the U17, 191 in U19 and 138 in U21) and 482 from the female category (144 players in the U17, 194 in U19 and 144 in U21).

The International Basketball Amateur Federation (FIBA) defines the international rules of basketball and is responsible for controlling and regulating all international competitions. In the World Championship in the U17, U19 and U21 categories, the participation of the athletes must be that age or younger. The criteria selection used indicates that at least 10 participating athletes are born in the same year. Applying this rule, in the analysis, in the male category a 15-year-old athlete was excluded in the U17, another aged 16 in the U19 and eight athletes in the U21 (seven players were 18 years old and one was 17). In the female category five players aged 15 and two aged 17 were excluded in the U17, seven players aged 16 and two aged 15 in the U19 and four players aged 17 and two aged 16 in the U21.

Procedure

The following variables were studied: gender, category, season, team, classification, position and date of birth. Also the height of the players was registered and the relative variables of the performance of the players (games played; minutes played; converted field goals, tries, and the percentage of effectiveness; two point field goals, tries, and the percentage of effectiveness; three point field goals, tries, and the percentage of effectiveness; free goals scored, tried, and the percentage of effectiveness; defensive rebounds; offensive and total of rebounds; assistances; personal faults; recuperations; stolen; blocked; points; points per game; rebounds per game and game assistance).

The information was collected from the FIBA website (<http://www.fiba.com/>). Afterwards the variable term was generated, dividing the dates of birth of the players into four terms (quarters) that start on the 1st of January and end on the 31st of December of the same year. This way the athletes born from the 1st of January until the 31st of March form the first term (Q1), the players born from the 1st of April until the 30th of June form the second term (Q2), the players born from the 1st of July until the 30th of September belong to the third quarter (Q3) and finally the players born from the 1st of October until the 31st of December make up the fourth term (Q4).

Analysis of information

To determine the RAE, the Chi-squared test was used to determine if the distribution of the dates of birth differ significantly from the theory distribution that is hoped to be found (in which the probability of finding athletes born in whichever term of the year is the same).

To compare between the height of the players and the relative performance variables for each term of birth, an ANOVA was used and the post-hoc analysis used the Tukey range test, a previous guarantee of normality (Kolmogorov–Smirnov test) and an equality (Levene test). In the case that the requirements of application were not met, the use of ANOVA is rejected and the Kruskal–Wallis test is used. In this study the statistic tests are considered significant when $p < 0.05$.

Results

Table 1 shows the term distribution of the birth dates of all players of the basketball world championships in lower categories.

The global distribution observed is different than expected in both male ($\chi^2=52.41$; d.f.=3; $p<0.001$; Figure 1), and female categories ($\chi^2=45.43$; d.f.=3; $p<0.001$; Figure 2).

When analyzing the categories in the U17 competition, the distribution observed is different than the uniform expected in the male ($\chi^2=43.66$; d.f.=3; $p<0.001$) and female categories ($\chi^2=11.28$; d.f.=3; $p<0.011$). The same happened in the U19 category in both the male ($\chi^2=17.65$; d.f.=3; $p<0.001$) and female categories ($\chi^2=22.87$; d.f.=3; $p<0.001$). Finally in the U21 category the distribution observed does not differ from the expected in either male ($\chi^2=4.32$; d.f.=3; $p<0.229$) or female categories ($\chi^2=6.50$; d.f.=3; $p<0.091$).

Table 1. Terms of the date of births of all players in the Basketball World Championships U17, U19 and U21

Gender		Overall		U17		U19		U21	
		Observed	Expected	Observed	Expected	Observed	Expected	Observed	Expected
Males	Q1	176	118	66	35.8	68	47.8	42	34.5
	Q2	126	118	38	35.8	49	47.8	39	34.5
	Q3	102	118	26	35.8	47	47.8	28	34.5
	Q4	68	118	12	35.8	27	47.8	29	34.5
	Total	472		142		191		138	
	χ^2	52.41		43.66		17.65		4.32	
	Sig.	0.000		0.000		0.001		0.229	
Females	Q1	159	120.5	50	36	71	48.5	38	36
	Q2	144	120.5	40	36	57	48.5	47	36
	Q3	102	120.5	31	36	38	48.5	33	36
	Q4	77	120.5	23	36	28	48.5	26	36
	Total	482		144		194		144	
	χ^2	35.43		11.28		22.87		6.50	
	Sig.	0.000		0.010		0.000		0.090	

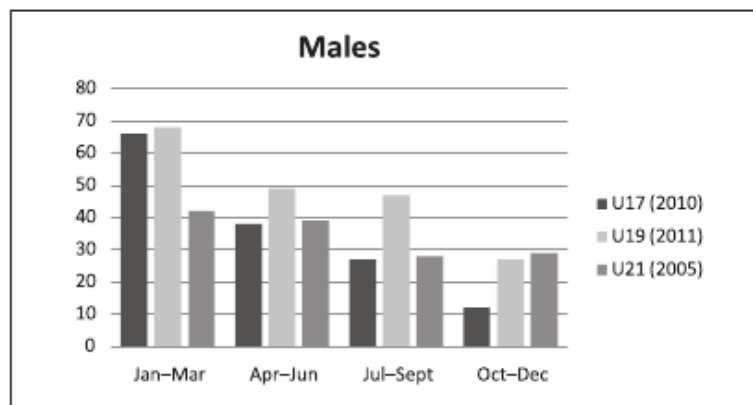


Figure 1. Distribution of the dates of birth in function of age in the male categories.

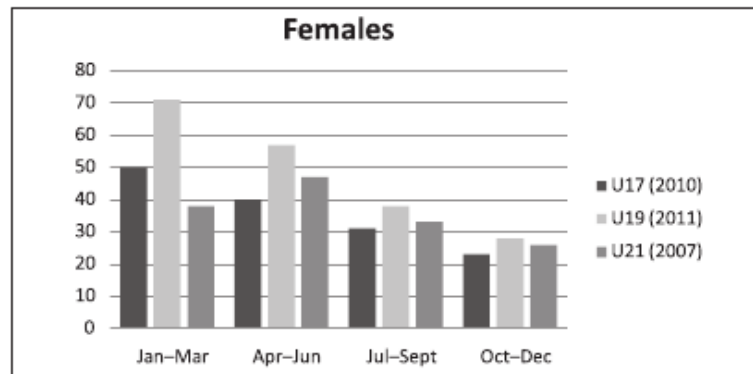


Figure 2. Distribution of the dates of birth in function of age in the female categories.

Specific positions

In the analysis of the specific positions (Table 2) a different distribution was found in the birth terms than the one expected in all of the positions ($p < 0.05$) in the male category, being more distinct in the positions that require higher physical form (centre and power forward). In the female category the distribution in terms are different in the point guard, shooting guard and small forward ($p < 0.05$).

Height of players

When comparing height in the four terms, significant differences were found ($p < 0.008$) in the male category, although no differences were found using the post-hoc analysis between the first and fourth term. Two homogeneous subsets were defined, the first formed by the heights of the first (195 cm), third (195.41 cm) and fourth terms (197.86 cm); the second is formed by the second (198.45 cm) third (195.41 cm) and fourth terms (197.86 cm). In the female categories no significant differences were found.

Performance

Male category. In the U17 category after the application of the Kruskal–Wallis test, significant differences were found ($p < 0.017$) in the percentage of three point field throws, showing better percentages in players born in the first (22.5%) or in the second term (22.8%) of the year than players born in the third (20.0%) and fourth terms (21.4%).

In the U19 category significant differences were found ($p < 0.036$) using the Kruskal–Wallis test in the points obtained per game with values of 6.7% for the first term, 7.3% for the second term, 5.2% for the third term and 6.8% for the last term. In the U21 category no significant differences were found in either of the variables studied.

Table 2. Birth terms of players in the Basketball World Championships in predicting performance in specific positions

Gender		Point-Guard		Shooting-Guard		Small-Forward		Power-Forward		Centre	
		Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.	Obs.	Exp.
Males	Q1	21	12.8	24	11.8	22	15.3	19	11.8	20	18
	Q2	6	12.8	7	11.8	18	15.3	12	11.8	27	18
	Q3	18	12.8	10	11.8	14	15.3	11	11.8	15	18
	Q4	6	12.8	6	11.8	7	15.3	5	11.8	10	18
	Total	51		47		61		47		72	
	χ^2	14.65		17.77		8.05		8.40		8.78	
	Significance	0.002		0.000		0.045		0.038		0.032	
Females	Q1	19	10	24	13.5	17	13.3	11	11.5	22	20.3
	Q2	11	10	9	13.5	21	13.3	13	11.5	23	20.3
	Q3	4	10	13	13.5	5	13.3	10	11.5	22	20.3
	Q4	6	10	8	13.5	10	13.3	12	11.5	14	20.3
	Total	40		54		53		46		81	
	χ^2	13.40		11.93		11.53		0.44		2.61	
	Significance	0.004		0.008		0.009		0.933		0.457	

Female category. No significant differences were found in the performance by terms in the U17 category. In the U19 category differences were found in the percentage of field throws ($p < 0.005$) with lower percentages in the first (33.1%) and second terms (34.8%) in relation to the third (41.7%) and fourth terms (39.2%). In the percentage of the two points ($p < 0.005$), the same performance and values were found in all four terms respectively, 35.2%; 36.9%; 46.6% and 41.1%. The assistances ($p < 0.013$) show values of 8.9%, 4.7%, 7.1% and 7.1% for the four terms respectively, showing lower values in the second term. The assistances per game ($p < 0.013$) show values of 1.17%, 0.64%, 0.95% and 0.94% for the four terms, and also show lower values in the second term. Finally, in the U21 category no significant values were found in the performance with regard to the term of birth.

Discussion

In the present study, the existence of the relative age effect has been confirmed in the Basketball World Championships in U17 and U19. In the U21 championship no significant differences were found. The same behaviour was found in the male and female categories. Also, the effects of relative age persist when talking about specific positions, proving to be more distinct in the positions that require more height in the male category. In the female category the effects of the relative age are more significant in the positions that require less height. However, the height of the players does not show expected values if the relative age effect exists. No significant differences were found in the height of the players analysed. Finally, small variations have been found in the performance of the

players with regard to the effect of the term of birth in both male and female categories, although these variations do not coincide with the existence of the relative age effect.

The existence of the relative age effect in basketball has been documented by various authors (Delorme and Raspaud, 2009; Delorme et al., 2010; Esteva et al., 2006) in male categories. Most investigations analyse male sport and few have been done in female categories and even fewer in basketball. Delorme et al. (2010) found a relative age effect in female basketball and Roman and Fuchslocher (2011) found it in football in 2011. These studies, as with the present one, disagree with the ones done by Delorme and Raspaud (2009) who found no relative age effect in female basketball. This effect may have been found in other young athletes in other sport disciplines (Ashworth and Heyndels, 2007; Helsen et al., 1998, 2005).

As in this study, the investigations done in German football by Schorer et al. (2009b) or in handball by Gutiérrez et al. (2012) found a slight fall in the relative age effect as the age of the athletes increases.

Schorer et al. (2009b) documented a relative age effect in different specific positions in German football, proving results that correspond with those obtained in the present study in the male categories, as the positions that require a higher physical form are taken more often by athletes born in the first months of the year. The results found in female categories do not support the idea of the relative age effect as the players born in the first months of the year tend to take base point, shooting guard and small guard positions, which are less dependent on biologic maturity. However, in football, Roman and Fuchslocher (2011) found a stronger relative age effect in goalkeeping and defence positions than in midfield and upfront positions.

In the present study no relative age effect was found in function of height or performance of the players. Schorer et al. (2009a) documented similar results in handball and determined that the cause of RAE is not related to either height, weight or technical abilities, as no differences were found between relatively older and younger players. Neither anthropometric factors nor physical performance in young footballers found a RAE (Carling et al., 2009; Hirose, 2009).

Conclusions

The relative age effect exists and is significant in the Basketball World Championships in both male and female U17 and U19 players. This effect diminishes as the age of the athletes increases, and disappears in U21.

In specific positions the effect of relative age is also significant, being in the male category clearer in the centres, power forwards and small forwards and less in point guards and shooting guards. In the female category the results do not support the existence of the relative age effect.

In the male category, differences were found in the height of the players with regard to the term of birth, although these differences do not coincide with those expected if the relative age effect exists. However, no significant differences were found in height in the female categories.

The performance of the players with regard to the birth term shows minimal differences in the male category in the U17, as the players born in the first two terms obtained

better percentages in the three point field throws than the ones born in the last terms of the year. In the U19, the points obtained are fewer in players that belong to the third term than the rest of the terms. In the female category some differences were found in the U19 but they do not support the existence of the RAE and no differences were found in either U17 or U21.

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References

- Armstrong HG (1966) A comparison of the performance of summer and autumn-born children at eleven and sixteen. *British Journal of Educational Psychology* 36: 72–76.
- Ashworth J and Heyndels B (2007) Selection bias and peer effects in team sports: The effect of age grouping on earnings of German soccer players. *Journal of Sports Economics* 8: 355–377.
- Baker J, Schorer J and Cobley S (2010) Relative age effects: An inevitable consequence of elite sport? *Sportwissenschaft* 40: 26–30.
- Barnsley RH and Thompson AH (1988) Birthdate and success in minor hockey: The key to the NHL. *Canadian Journal of Behavioural Science* 20: 167–176.
- Carling C, le Gall F, Reilly T, et al. (2009) Do anthropometric and fitness characteristics vary according to birth date distribution in elite youth academy soccer players? *Scandinavian Journal of Medicine & Science in Sports* 19(1): 3–9.
- Delorme N and Raspaud M (2009) Is there an influence of relative age on participation in non-physical sports activities? The example of shooting sports. *Journal of Sports Sciences* 27(10): 1035–1042.
- Delorme N, Boiché J and Raspaud M (2010) Relative age and dropout in French male soccer. *Journal of Sport Sciences* 28(7): 717–722.
- Delorme N, Chalabaev A and Raspaud M (2011) Relative age is associated with sport dropout: Evidence from youth categories of French basketball. *Scandinavian Journal of Medicine & Science in Sports* 21(1): 120–128.
- Esteva S, Drobnic F, Puigdemívol J, et al. (2006) Fecha de nacimiento y éxito en el baloncesto profesional. *Medicina de l'esport* 41(149): 25–30.
- FIBA.com (2012) *FIBA Archive*. Available at: <http://archive.fiba.com> (accessed 13 May 2012).
- Freyman R (1965) Further evidence on the effect of date of birth on subsequent school performance. *Educational Research* 8: 58–64.
- Gibbs BG, Jarvis JA and Dufur MJ (2011) The rise of the underdog? The relative age effect reversal among Canadian-born NHL hockey players: A reply to Nolan & Howell. *International Review for the Sociology of Sport*. Epub ahead of print 22 August 2011. DOI: 10.12690211414343.
- Grondin S, Deshaies P and Nault LP (1984) Trimestres de naissance et participation au hockey et au volleyball. *La Revue Québécoise de l'Activité Physique* 2: 97–103.
- Gutiérrez Ó, Saavedra M, Contreras J, et al. (2012) Influencia del año de nacimiento de una jugadora en las posibilidades de ser captada como talento en el balonmano femenino internacional. *Apunts* 108(2): 46–52.
- Helsen WF, Starkes JL and Van Winckel J (1998) The influence of relative age on success and dropout in male soccer players. *American Journal of Human Biology* 10(6): 791–798.
- Helsen WF, Starkes JL and Van Winckel J (2000) Effect of a change in selection year on success in male soccer players. *American Journal of Human Biology* 12: 729–735.

- Helsen WF, Van Winckel JL and Williams AM (2005) The relative age effect in youth soccer across Europe. *Journal of Sports Sciences* 23: 629–636.
- Hirose N (2009) Relationships among birth-month distribution, skeletal age and anthropometric characteristics in adolescent elite soccer players. *Journal of Sports Sciences* 27(11): 1159–1166.
- Jullien H, Turpin A and Carling C (2008) Influence of birth date on the career of French professional soccer players. *Science & Sports* 23: 149–155.
- Lidor R, Côté J, Arnon M, et al. (2010) Relative age and birthplace effects in division 1 players – Do they exist in a small country? *Talent Development and Excellence* 2(2): 181–192.
- Malina RM (1994) Physical growth and biological maturation of young athletes. *Exercise and Sport Sciences Reviews* 22: 389–434.
- Malina RM, Bouchard C and Bar-Or O (2004) *Growth, Maturation, and Physical Activity*. Champaign, IL: Human Kinetics.
- Musch J and Hay R (1999) The relative age effect in soccer: Cross-cultural evidence for a systematic discrimination against children born in late competition year. *Sociology of Sport Journal* 16: 54–64.
- Nolan JE and Howell G (2010) Hockey success and birth date: The relative age effect revisited. *International Review for the Sociology of Sport* 45(4): 507–512.
- Roman M and Fuchslocher J (2011) Influence of the selection level, age and playing position on relative age effects in Swiss Women's Soccer. *Talent Development and Excellence* 3(2): 239–247.
- Russell RJH and Startup MJ (1986) Month of birth and academic achievement. *Personality and Individual Differences* 7(6): 839–846.
- Schorer J, Baker J, Büsch D, et al. (2009a) Relative age, talent identification and youth skill development: Do relatively younger athletes have superior technical skills? *Talent Development and Excellence* 1: 45–56.
- Schorer J, Copley S, Büsch D, et al. (2009b) Influences of competition level, gender, player nationality, career stage and playing position on relative age effects. *Scandinavian Journal of Medicine & Science in Sports* 19: 720–730.
- Simmons C and Paull GC (2001) Season-of-birth bias in association football. *Journal of Sports Sciences* 8: 677–686.