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TECHNOSCIENCE ARTICLE

Relative Age Effect on Some Motorical Properties of Young Football Players

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Study Area: Denizli, Turkey
Coordinates: 37°46′N; 29°05′E

Key words: Sports talent, Playing Position

Ethical approval and relevant permissions were ensured. For participants in competitive sports activities from Sports clubs' Directors, Parents, and Coaches.

Abstract

The U14, U15 and U16 infrastructure, which competes in the development leagues of a professional football team, was carried out with a total of 60 volunteer footballers with the participation of team players. 21 athletes from the U14, 19 from the U15 and 20 from the U16 age category participated in the study. In the study, height, body weight, vertical jump, 10m and 30m sprint and agility measurements of volunteer participants were made. Football players who born in the first half of the year and the second half of the year were compared, there was no significant difference between parameters. In the study, it was determined that the athletes born in the first months of the year show early physical development and have advantages in some performance parameters. Coaches should form the team by considering their biological maturation during the selection of their athletes for the team. The disadvantages of the relative age effect among athletes should be groups based on the birth months of the athletes and should try to prepare appropriate training programs for the groups.

Introduction:

The Relative Age Effect in Sport

The attainment of sports expertise has been of great interest to coaches and sports psychologists. Talented athletes are identified from a young age and enter programs to help them develop into elite athletes. A range of factors may influence a coach's judgment on the potential of an athlete, whether it's physical, technical, or mental qualities. An exhaustive amount of research has identified that the month that an athlete is born in may have a positive or negative effect on his development to sporting expertise (Tayara, 2019).

Psychomotor development, physical growth, and development of the central nervous system in parallel with the organism's demand-dependent mobility acquisition. In other words, it is a lifelong process that involves the acquisition of skills that are based on movement, starting in the prenatal period. Although psychomotor skills are commonplace and easy for adults, children need time to acquire these skills. Children, therefore, need to be supported by adults while gaining psychomotor skills. In order for this support to be healthy, it is very important to know the features of psychomotor development and to plan activities and training in this direction (Gümüsdag & Yildirim; 2018).

FIFA has taken a series of precautions to protect the players; FIFA states that football is a harsh game, and the referee is to permit to continue the game even if the player-ball interferences are tough. Nevertheless, behaviors like intending to interfere or interfering in a harmful manner need be punished (Gümüsdag *et al.,* 2011). While the outcome of a successful match is mostly determined by its technical and tactical level, high-intensity athletic performance contributes to the elite level performance (Mohr *et al.,* 2008). Today, turning to sports at an early age and achieving success in elite sports at a younger age has made it necessary for children to train for many years and perform better. In the puberty period, especially in men, around 13 years of age, the increase in androgen secretion, and the development of features such as strength, endurance, and speed, which are motoric, increase rapidly with the training (Islegen *et al.,* 1989). It has been revealed in studies that relative age has a significant effect on the motor characteristics of children. Even if children were born in the same year, the importance and effect of which month they were born revealed the concept of Relative Age Effect (BYE). The advantage of preterm birth in the same year is called the "Relative Age Effect" or "Date of Birth Effect" (Mülazimoglu *et al.,* 2013). Academic education categories are organized according to the calendar age,

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which is expressed in chronological age in our country as in many countries. Studies conducted in the field of sports in recent years reveal that those who are early in biological maturation have high selection levels. The fact that early biological maturation is observed at higher rates in those born in the first months of the year strengthens the presence of the relative age effect (Roberts *et al.,* 2012). The relative age effect (RAE) in sport consists of the lower presence of athletes born in the months furthest from the cut-off date established by the competitive system, which normally coincides with the last months of the year (Salinero *et al.,* 2013). This study aims to investigate the effect of relative age on some motoric features of young footballers.

Materials and Methods:

ParticipantsThis study was carried out with a total of 60 volunteer footballers, who participated in the U14- U15-U16 infrastructure team players who competed in the development leagues of a professional football team. 21 athletes from the U14 age category, 19 from the U15 category, and 20 from the U16 category participated in the study.

Data Collection Tools

In the study, height, body weight, vertical jump, 10m and 30m sprint, and agility measurements of volunteer participants were made. An electronic scale with a precision of 0.01 cm and 0.01 kg (SECA, Germany) was used to measure the length of the participants.

Collection of Data

All measurements of the participants were made by the same researcher in the Pamukkale University Faculty of Sport Sciences performance laboratory. Body weights (VA) with height measurements were measured with electronic scales, following standard techniques with bare feet and shorts, t-shirts. Body mass index (BMI); was obtained by dividing body weight by the square of the height (Tamer, 1991).

Measures

Vertical jump test Digital jumpmeter (Takei, Japan) with a sensitivity of 0.1 cm was used for vertical jump measurement. The validity of the test is 0.78; reliability is given between 0.90 and 0.97 (Zorba, 1999).

10 m. and 30 m sprint test 10 and 30 m sprint tests were used to determine the speed of the participants. Test battery photocells (Newtest 300, Finland) were placed at 0, 10, and 30 m. As soon as these meters were passed, the values were transferred to the computer via Newtest software and recorded. He reported the reliability coefficient of the speed test between 0.74-0.97 (Özkara, 2002).

Pro-Agility Agility Test The pro-agility agility test area, also known as the 20-yard running test, is determined by placing markers to the left and right of the start line 5 yards (4.57m). A photocell door is placed on the starting line. Repeat transition times can be taken in this way. Before the application starts, the participant takes its place in the starting line. When it is ready, it first touches the marker on the right and then the marker on the left, passing the starting line and ending the test (Bayraktar, 2013).

Data Analysis

Data showed a normal distribution was analyzed with the Shapiro-Wilk test, and it was understood to show a normal distribution t-test in Independent Groups and a one-way ANOVA in multiple comparisons at 0.05 significance level to understand whether there was a significant difference between some motoric features according to the month groups of birth.

Results:

Table-1: Frequency percentage distribution of the months in which the footballers were born as per the categories they played

Age (Month)	U-14		U-15		U-16		Total	
	N	Per (%)	N	Per(%)	N	Per(%)	N	Per(%)
1st 6 mounts	13	61.90	11	57.89	12	60	36	60
2nd 6 months	8	39.10	8	42.11	8	40	24	40
Total	21	100	20	100	20	100	60	100

The athletes fighting in all categories have a higher birth rate in the first 6 months period (Table-1).

Table 2. Frequency and percentage distributions of footballers as per their positions and quarters of the months they were born

Birth range (Quarter of Yr)	U-14		U-15		U-16		Total	
	N	Per. (%)	N	Per. (%)	N	Per. (%)	N	Per. (%)
Jan-Feb-Mar.	8	38.10	6	31.58	7	35	21	35
Apr-May-Jun.	5	23.81	5	26.32	5	25	15	25
Jul-Aug-Sep.	3	14.29	3	15.79	6	30	12	20
Oct-Nov-Dec.	5	23.81	5	26.32	2	10	12	20
Total	21	100	19	100	20	100	60	100

Similar to Table 1, the birth rates in the first quarter were found to be higher in Table 2 compared to the categories played by the footballers.

Table 3. One Way Anova Analysis table of demographic and motoric features of footballers according to their quarters

	N	Mean	Sd	F	p
Height (cm)	1. Quarter	21 171	4.63	0.88	0.46
	2. Quarter	15 173.07	4.8		
	3. Quarter	12 172.92	2.68		
	4. Quarter	12 172	4.02		
Body Weight (kg)	1. Quarter	21 62.67	3.97	0.76	0.52
	2. Quarter	15 64.16	4.85		
	3. Quarter	12 62.51	2.53		
	4. Quarter	12 62.12	3.41		
BWI (kg/m²)	1. Quarter	21 21.44	1.19	0.64	0.59
	2. Quarter	15 21.43	1.51		
	3. Quarter	12 21.02	0.9		
	4. Quarter	12 21.25	1.45		
10 m Sprint (s)	1. Quarter	21 2.01	0.09	2.46	0.07
	2. Quarter	15 2.05	0.06		
	3. Quarter	12 1.96	0.1		
	4. Quarter	12 2.02	0.06		

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30 m Sprint (s)	1. Quarter	21	5.16	0.14	2.6	0.06
	2. Quarter	15	5.35	0.33		
	3. Quarter	12	5.16	0.21		
	4. Quarter	12	5.26	0.16		
Vertical Jump (cm)	1. Quarter	21	43.57	4.46	0.68	0.57
	2. Quarter	15	44.53	4.93		
	3. Quarter	12	42.33	4.54		
	4. Quarter	12	42.58	3.99		
Agility (s)	1. Quarter	21	6.03	0.11	0.84	0.48
	2. Quarter	15	5.98	0.13		
	3. Quarter	12	6	0.11		
	4. Quarter	12	6.05	0.16		

There was no significant difference between the height, body weight, BMI, sprint, agility and jump values of the players according to the quarter they were born ($p > 0.05$).

Table 4. T-test analysis table of demographic and motoric features of independent footballers according to the term of their birth in independent groups

Measures	Semester	N	Mean	Sd	t	p
Height (cm)	1st 6 mounts	36	171.86	4.75	-0.53	0.6
	2nd 6 mounts	24	172.46	3.37		
Weight (kg)	1st 6 mounts	36	60.8	3.98	-0.83	0.43
	2nd 6 mounts	24	62.92	4.4		
BWI (kg/m2)	1st 6 mounts	36	20.7	1.09	-0.97	0.36
	2nd 6 mounts	24	21.49	1.55		
10 m Sprint (s)	1st 6 mounts	36	2.03	0.08	1.67	0.1
	2nd 6 mounts	24	1.99	0.09		
30 m Sprint (s)	1st 6 mounts	36	5.24	0.25	0.51	0.61
	2nd 6 mounts	24	5.21	0.19		
Vertical Jump (cm)	1st 6 mounts	36	43.97	4.61	1.29	0.2
	2nd 6 mounts	24	42.46	4.18		
Agility (s)	1st 6 mounts	36	6.01	0.12	-0.58	0.56
	2nd 6 mounts	24	6.03	0.14		

No significant difference between athletes' height, body weight, BMI, sprint, agility and jump values according to the year they were born (Table-4).

Discussion:

It is observed that 35% of the players were born in the first quarter of the year and their birth percentages were close to each other in the other quarters to examine the relative age effect of the athletes who participated in the auditions according to the quarters of the year and the 6-month tranches. There was no significant difference between height, body weight, and some motoric characteristics of athletes competing in the U-14, U-15, and U-16 categories .

According to the analysis, there was not much difference between the height, body weight, BMI, speed, bounce, and agility values of football players born in the first half of the year and football players born in the second half of the year, and the values were close to each other and there was no significant difference between these parameters according to the semester born.

When the distribution of the months of the birth of the players according to the 6-month slices is analyzed, the rate of the athletes born in the first six months is 60%, while the rate of the athletes born in the other 6 months is 40%. When we look at the distribution according to the categories they play, it is seen that this situation is close to each other in all three categories of the year and that the birth rates of the athletes in the first 6 months period are higher in each category. It is seen that there is no significant difference between both demographic and motoric characteristics of the semester they were born.

The key finding of the current research suggests that relative age continues to be an important variable concerning youth sport participation and continued engagement; with the relatively oldest being more likely to participate and remain engaged between the ages of 10 to 16 years. The competition level was observed to be an important variable, with 'competitive' and 'recreational' trajectories varying in terms of relative age distribution and retention rates (55.9% vs. 20.7% continued to participate at age 16 years, respectively) (Smith, 2019).

As per Malina *et al.*(2004) significant differences in parameters related to strength and speed were observed among male football players of the same chronological age at early and late maturation levels, especially during the adolescent period. In a similar study, Myburgh *et al.,* (2016) young male tennis players grip their biologically early maturation of force, speed, vertical jump, and upper body strength; girls with handgrip strength and agility players stated that there is an advantage in performance. In contrast to these studies, the speed, bounce, and agility performances of different categories of footballers did not differ according to the month of birth. Bezuglov *et al.,* (2019) observed that RAE was highly prevalent in Russian soccer and was associated with age and performance level, and its prevalence remains high at all levels of elite youth football. RAE occurred in top-tier Russian adult soccer players at a lesser magnitude than in their younger counterparts, which might be due to a wider pool of soccer players to choose from, without the limitation of the year of birth. The common practice of placing children into age groups for sport may acutely benefit those who are more developed physically, emotionally, and cognitively (Mann & Ginneken, 2017). However, those who were born in the later stages of the year appear to experience an unintentional bias in their long-term sporting success (Mann & Ginneken, 2017). In accordance with this, coaches must be aware of a 'Relative Age Effect', where being born at a certain time of the year holds a distinct advantage in sport and academic success. In other words, those born later in the year appear to be at a disadvantage because they are typically physically, emotionally, and cognitively less developed than other children (https://www.scienceforsport.com/relative-age-effect/#toggle-id-1). Sports activities have great importance in terms of increasing young people's life skills (Cihan & Ilgar, 2018).

Literature data show that the relative age of

infrastructures is quite effective, and the physical performance of children born in the same year but in different months is different.

Conclusion:

The study found that athletes born in the first months of the year show early physical development and have advantages in some performance parameters. Coaches must form the team by considering their biological maturation in the process of selecting their athletes to the team. Considering the disadvantages of the relative age effect among the athletes, team coaches should form groups according to the month of birth of the athletes and should try to prepare appropriate training programs for the groups. In summary, the relative age effect is present in a wide range of elite sports and sheds light on the flaws of many talent identification systems. Due to the short-term approach to success in elite sports, coaches select players that will win them games in the immediate future. This means selecting players who are physically and emotionally more mature. The implications of this process will lead to a big pool of talent being overlooked and misrepresented. Talent identification programs must try to reduce the risk of the RAE by raising awareness, monitoring player's maturation rate, and avoid employing intensive early age talent selection. Future research directions may benefit from increased knowledge on the relative age effect in women's sports. Also, qualitative studies on talent identification programs across sports such as soccer, hockey, and basketball may help identify weaknesses, which may lead to further changes (https://believeperform.com/the-relative-age-effect-in-sport/).

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